



# AIRCRAFT MAINTENANCE MANUAL

## HIGHLIGHTS

REVISION NO. 33 Jun 01/10

Pages which have been revised are outlined below, together with the Highlights of the Revision

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### CHAPTER 76

L.E.P. 1- 2 Revised to Reflect this revision indicating  
new, revised, and/or deleted pages

76-11-00 Minor additions and amplification  
501, 505, SUPERSEDED TOOL RSE1041 BY TOOL RSE1041-1.  
507

76-11-33 Minor additions and amplification  
401- 402 SUPERSEDED TOOL RSE1041 BY TOOL RSE1041-1.

76-11-62 Minor additions and amplification  
401 SUPERSEDED TOOL RSE1041 BY TOOL RSE1041-1.

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## CHAPTER 76

### ENGINE CONTROLS

#### LIST OF EFFECTIVE PAGES

N, R or D indicates pages which are New, Revised or Deleted respectively  
Remove and insert the affected pages and complete the Record of Revisions and  
the Record of Temporary Revisions as necessary

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## CHAPTER 76

### ENGINE CONTROLS

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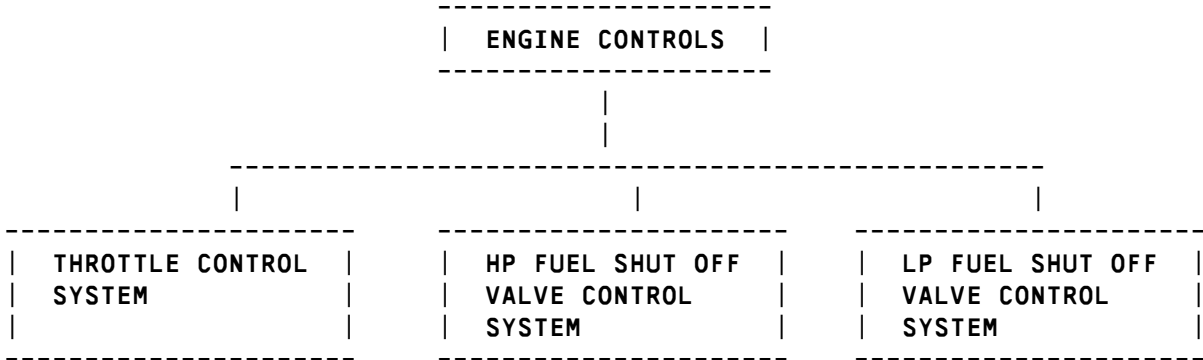
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**AIRCRAFT MAINTENANCE MANUAL**  
**GENERAL - DESCRIPTION AND OPERATION**

**1. General**

The engine control system consists of

- the throttle control lever
- the HP fuel shut off valve control lever
- the LP fuel shut off valve control lever



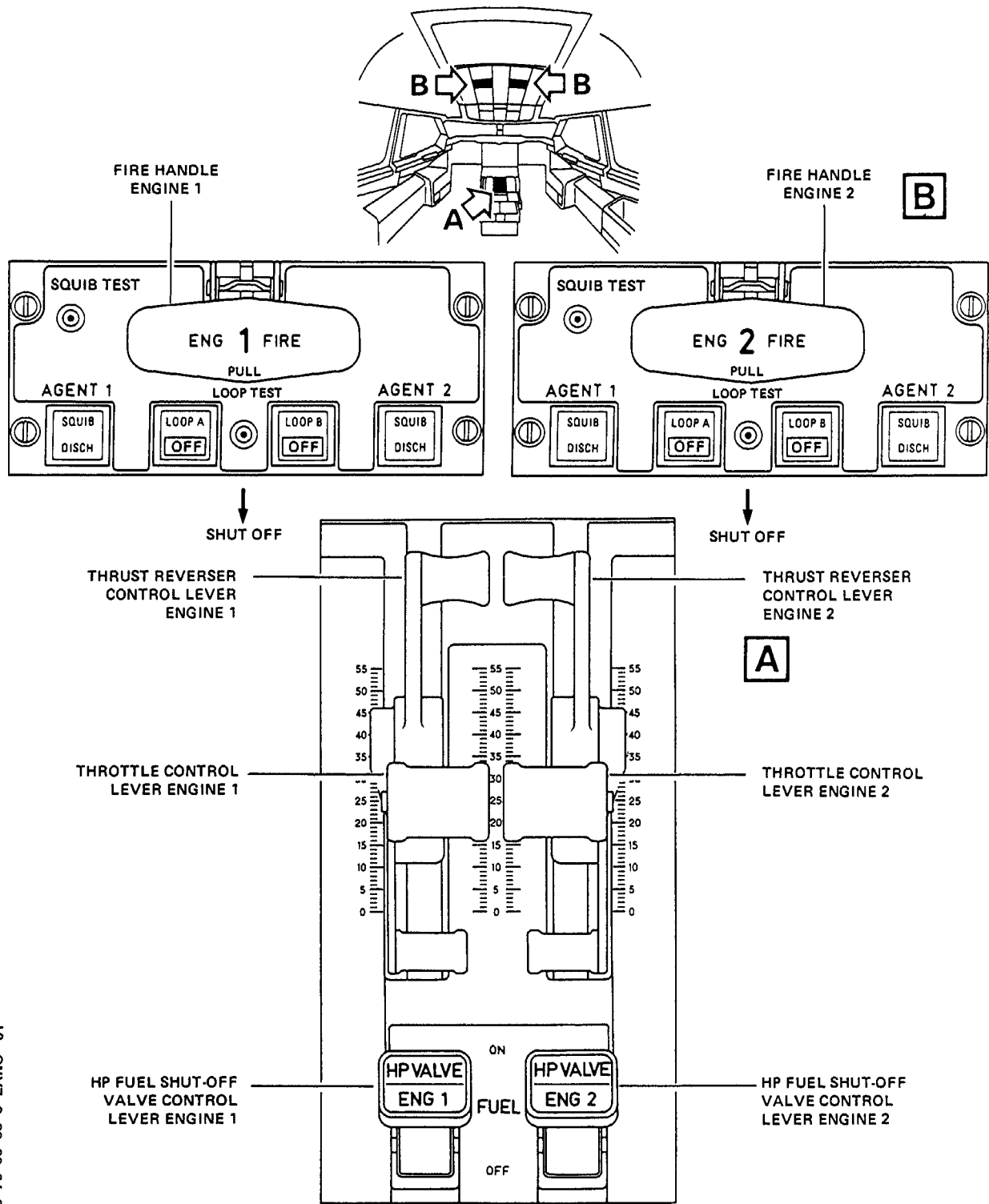
(Ref. Fig. 001)

**2. Throttle Control Lever**

The throttle control is electromechanical. A rod and cable system transmits the displacement of the throttle control lever located on the flight compartment center pedestal to the power lever located on the MEC (PLA position).

The throttle control lever position is transmitted to a throttle position detector which is attached just under the microswitch unit.

(Ref. Fig. 002)



Engine Control In Flight Compartment  
Figure 001

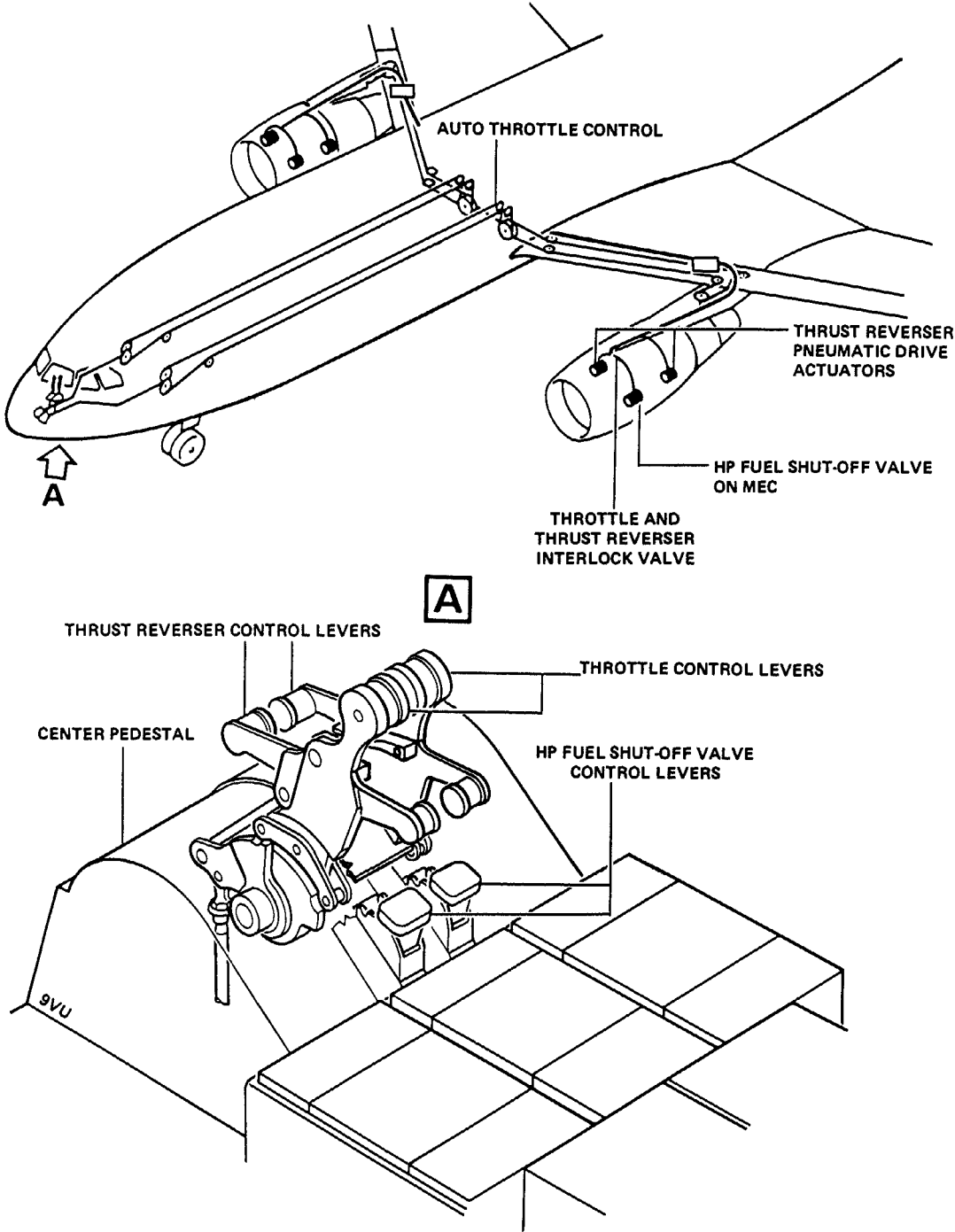
BM5 76 00 00 0 LANO - 01

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Power Control - Routing  
Figure 002

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**3. HP Fuel Shut Off Valve Control (Ref. Fig. 003)**

The HP fuel shut off control valve is electrically operated. When the HP fuel shut off valve control lever is placed in ON position, the corresponding engine ignition circuits are energized and an electrical signal causes a latching solenoid to open the valve.

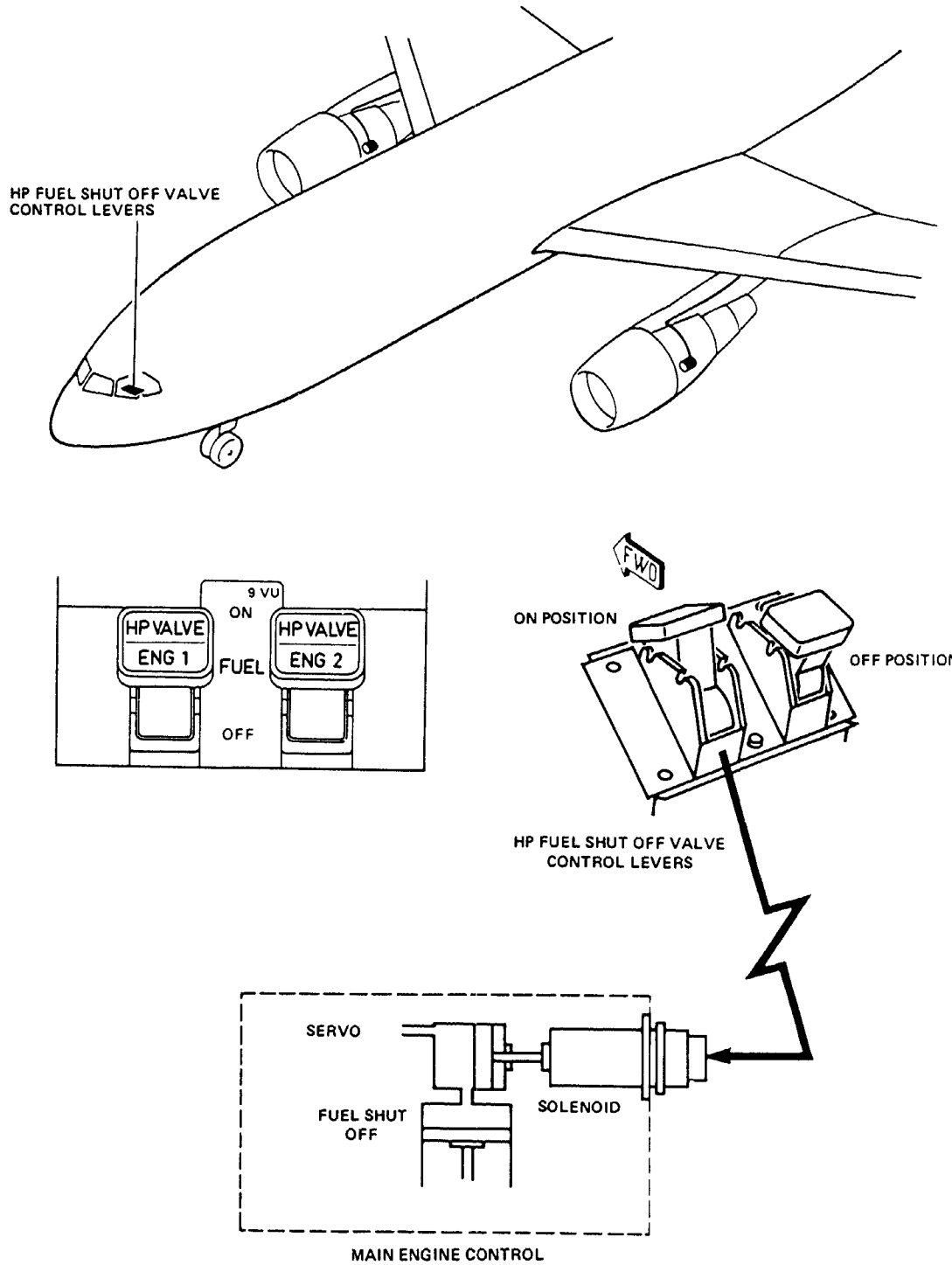
The fuel shut off valve will remain open until the off position is selected and an electrical signal is provided to the latching solenoid.

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HP Fuel Shut Off Valve System  
Figure 003

R EFFECTIVITY: 001-100,

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4. LP Fuel Shut Off Valve Control (Ref. Fig. 004)

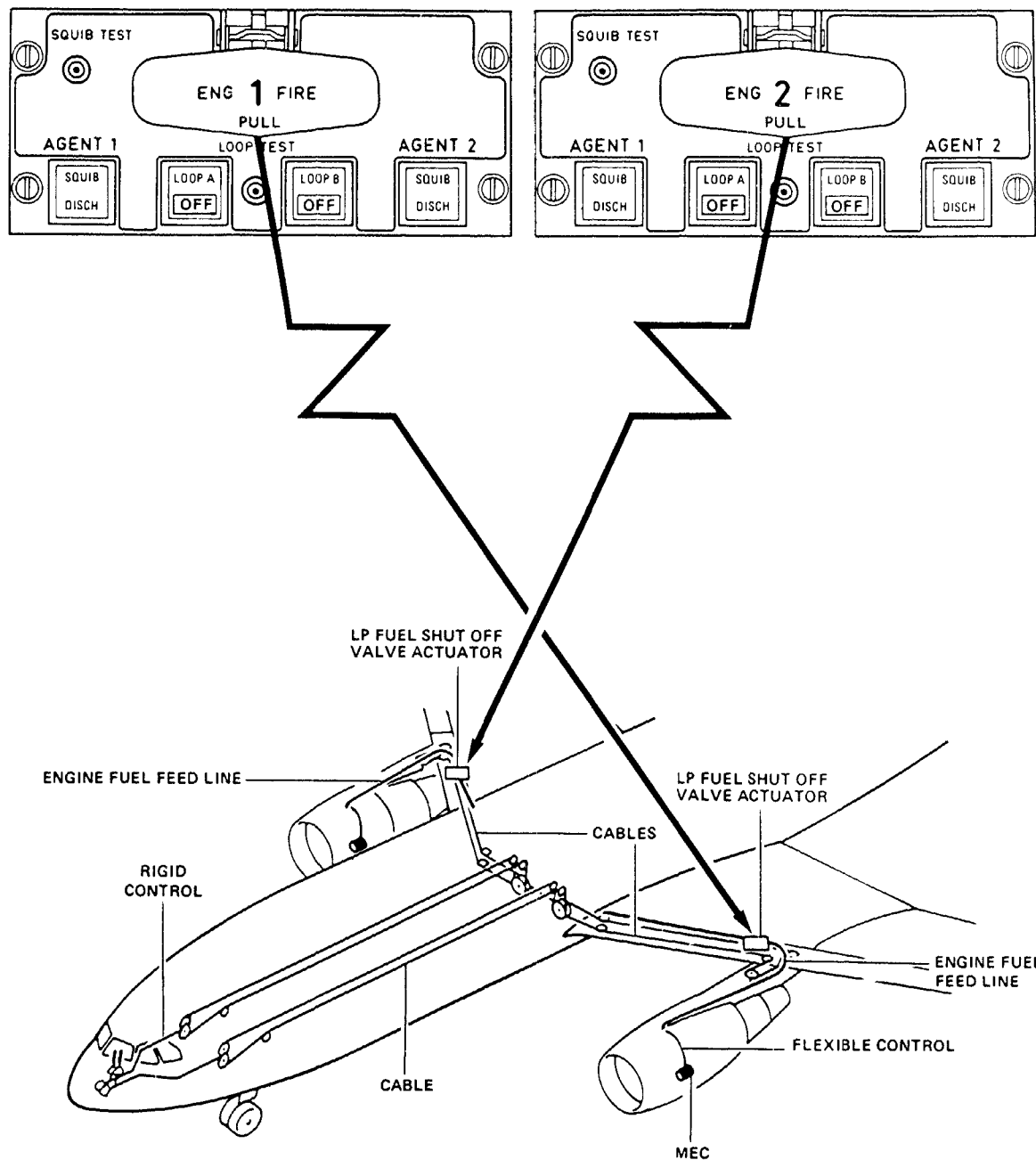
The LP shut off valve control is electrically operated. When the fire handle located in the flight compartment overhead panel is pulled, an electrical signal is sent to two motors which close the corresponding LP fuel shut off valve (Ref. 26-00).

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LP Fuel Shut Off Valve System  
Figure 004

BM5 76 00 00 0 LJM0 - 13.07  
DM5

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**POWER CONTROL - DESCRIPTION AND OPERATION**

**1. General**

Each engine is power controlled by means of a throttle control lever located in the flight compartment center pedestal.

(Ref. Fig. 001)

The control between the flight compartment and the engine is electromechanical and is used to modify engine rotational speed.

The power control consists of :

- the throttle control
- the thrust reverser control
- the HP fuel shut off valve control

**2. Throttle Control**

(Ref. Fig. 002)

The throttle control consists of :

- the throttle control lever
- the dynamometric rod
- the microswitch unit
- the throttle position detector (resolvers)
- the cable tension regulator
- the autothrottle coupling unit
- the secondary transmission pulley
- the primary transmission crank lever
- the throttle control heating system
- the MEC power lever.

**A. Throttle Control Mechanical Part**

Forward displacement of the throttle control lever results in displacement of the dynamometric rod and rotation of the bellcrank. Rotation of the bellcrank transmits the movement to a linkage (rods, bellcranks), which in turn rotate a quadrant on which is wound the control cable. After the quadrant, the cable is routed in the cargo compartment, up to the wing root.

The autothrottle coupling unit has the function of a bellcrank and directs the cable towards the leading edge, at pylon-to-wing attach fitting level, where the secondary relay is located.

The secondary relay consists of a pulley driven by the cable and is fitted with a pin to which a control rod is attached.

This rod sets into movement the primary transmission crank lever which is connected to a flexible push-pull control routed around the compressor case right side.

This cable directly connects the power lever angle on the MEC.

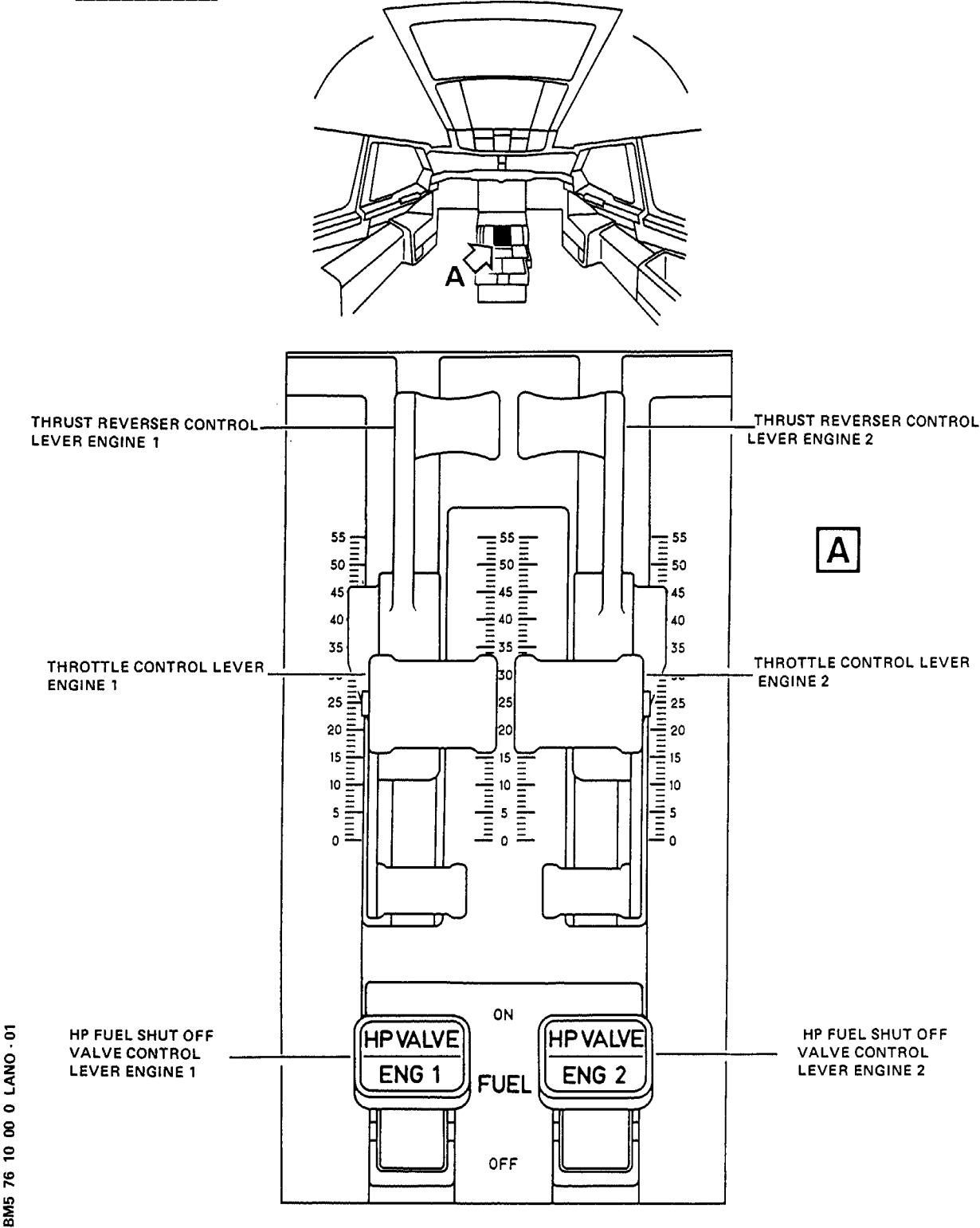
**(1) Throttle Control Lever**

(Ref. Fig. 003)

The throttle control lever range varies from forward idle to forward full throttle.

The engine is at idle when the throttle control lever and the thrust reverser control lever are in down position (reverser stowed).

In this position, the rocker arm forward roller is held in the moving sector slot by the return spring.



Power Control Location

Figure 001

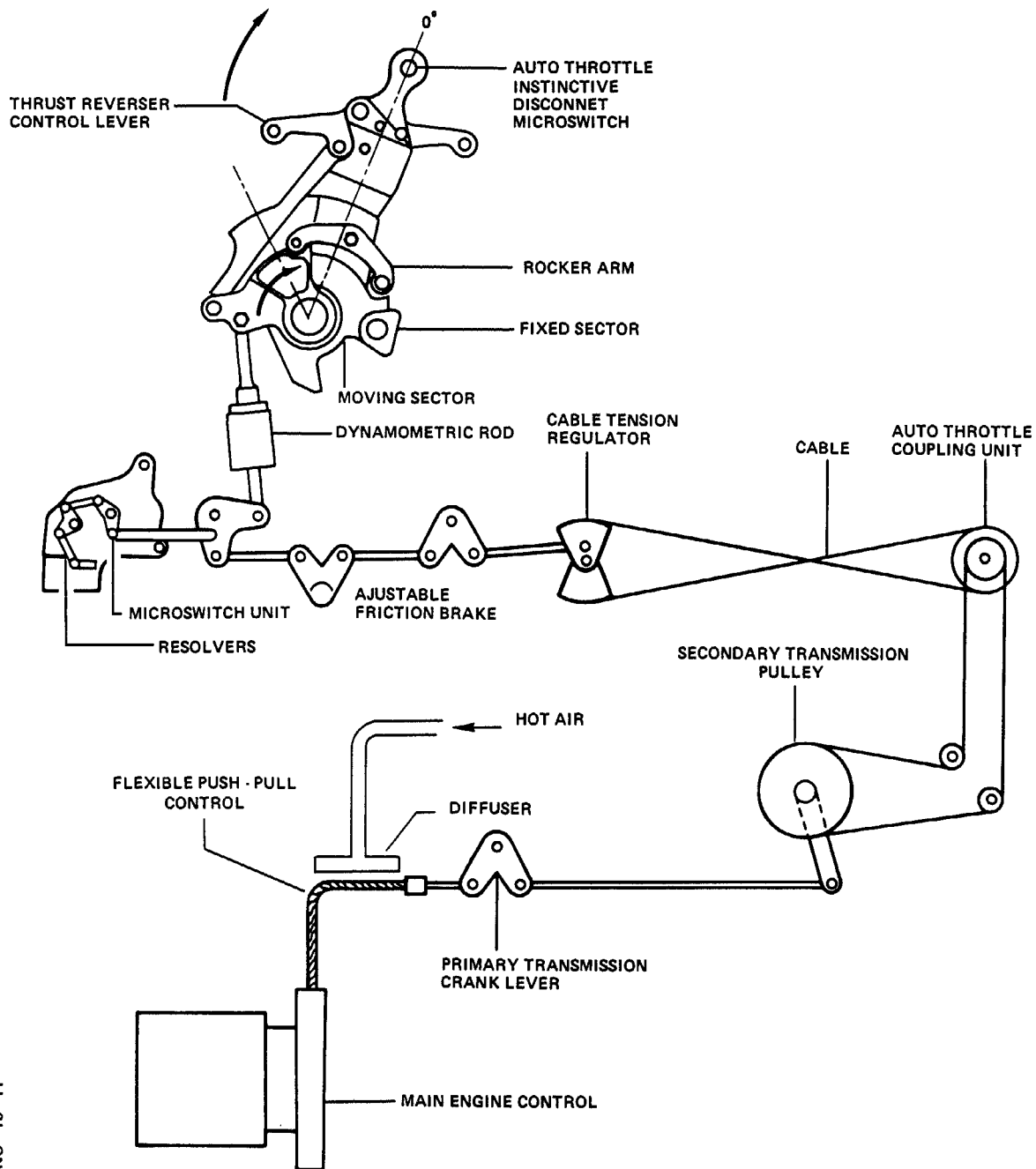
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FORWARD IDLE THROTTLE



Throttle Control - Schematic  
Figure 002

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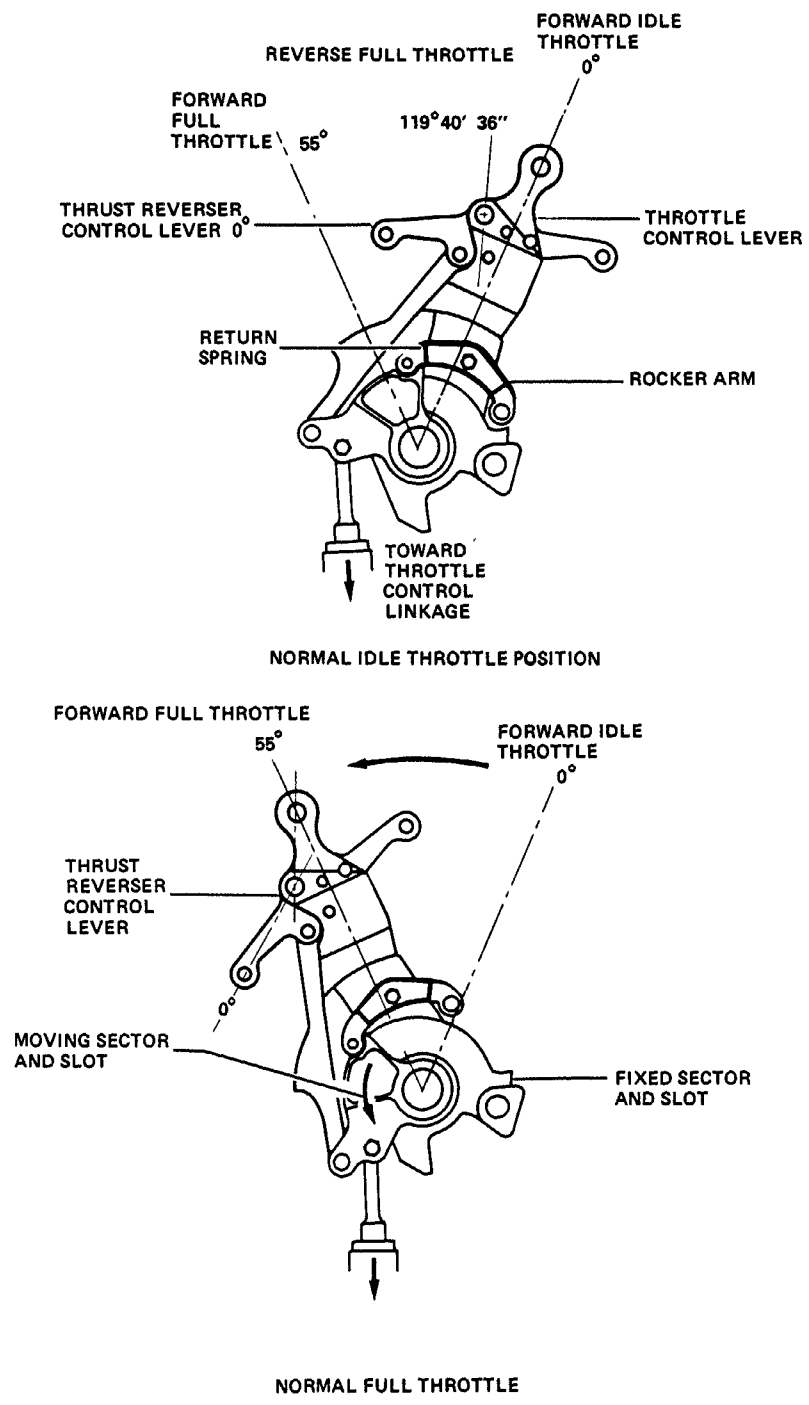
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Throttle Control Handle - Forward Thrust.  
Figure 003

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When the throttle control lever is moved, the engine power increases towards the forward full throttle, the thrust reverser control lever is locked in the down position.

The moving sector is then driven by the rocker arm forward roller.

The aft roller moves along the fixed sector cam, preventing the rocker arm from pivoting and so locking the forward roller in the moving sector slot.

**(2) Thrust reverser control lever**

(Ref. Fig. 004)

The thrust reverser control lever has a locking device preventing the movement towards reverse idle position if the throttle control lever is not itself in the forward idle position.

With the throttle control lever in idle position, movement of the thrust reverser control lever up to reverse idle is permitted.

Movement of the thrust reverser control lever rotates the moving sector via the connecting rod. The rocker arm pivots and the aft roller is locked in the fixed sector slot, so locking the throttle control lever in the idle position.

The thrust reverser control lever moves first in a neutral control range, and is then locked by the interlock stop which prevents further engine acceleration as long as both LH and RH thrust reversers are not fully deployed (Ref. 78-00).

The thrust reverser control lever can then be moved to the reverse full throttle position.

When the thrust reverser control lever is moved back toward the reverse idle position, a friction point signals to the pilot that he is going to reach the reverse idle position and that he can return in reverse full throttle is necessary.

**(3) Cable Tension Regulator**

(Ref. Fig. 005)

The cable tension regulator maintains constant tension of the cable irrespective of the variations in ambient temperature.

**(4) Autothrottle Coupling Unit**

(Ref. Fig. 006)

The coupling units are located in the FWD cargo compartment, at wing root.

Each coupling unit is activated by the autothrottle servomotor (according to the orders delivered by TCC1 [or TCC2 optional]) via the transmission gear and the associated torque shaft.

The movement is transmitted to a bevel gear, a clutch and then a dual pulley which drives the throttle control levers and engine controls. The magnetic clutch disconnects the pulley.

When the TCC is engaged in a mode, the magnetic clutch is closed. The de-clutch occurs when the pilot moves the throttle control levers and thus overrides the servomotor actuator.

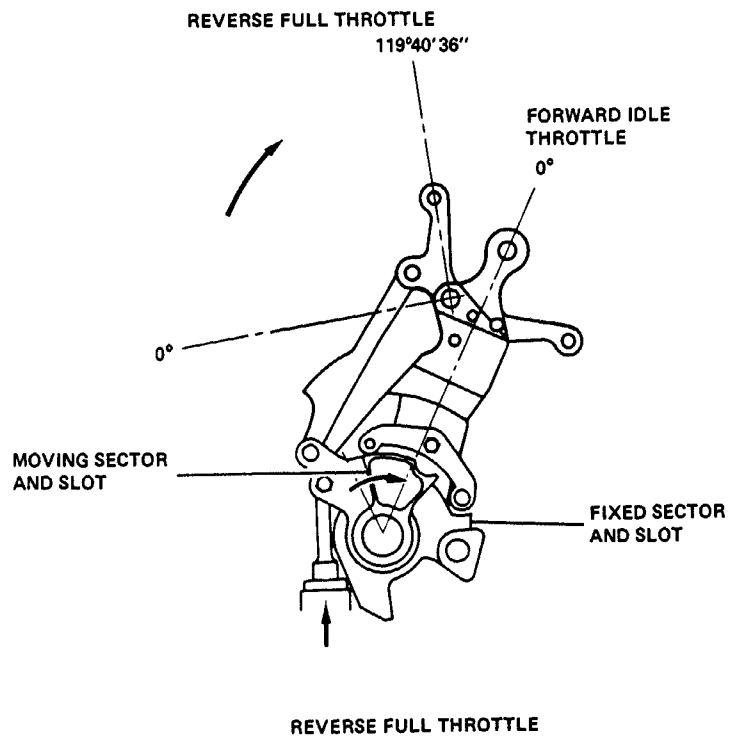
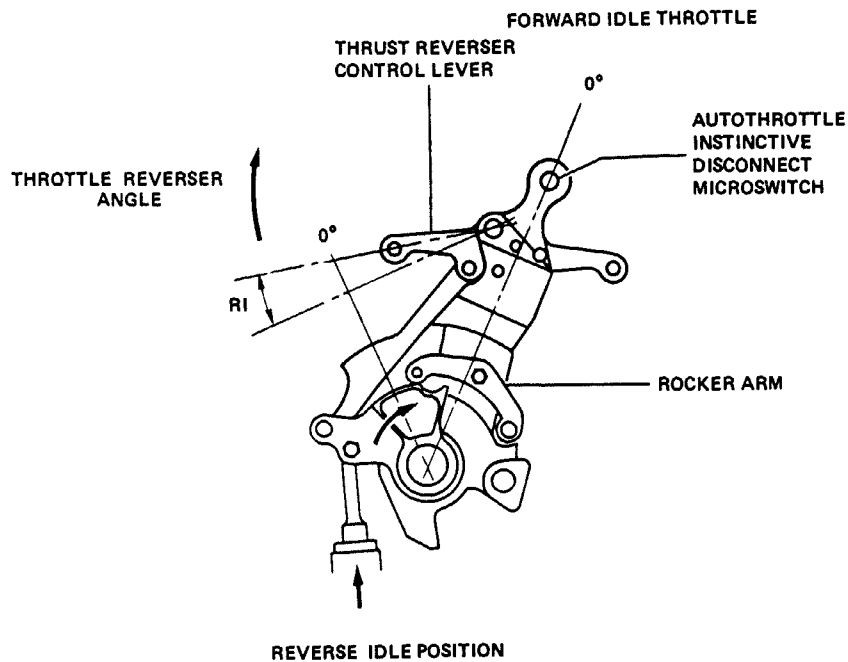
**(5) Secondary/Primary Relay Assembly (Ref. Fig. 007)**

The secondary and primary relay assembly is installed in the pylon.

The secondary transmission pulley assembly transforms the rotational movement into linear movement transmitted to the primary transmission crank lever via a rod.

The primary transmission crank lever rotation drives the pushpull

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Throttle Control Handle - Reverse Thrust  
Figure 004

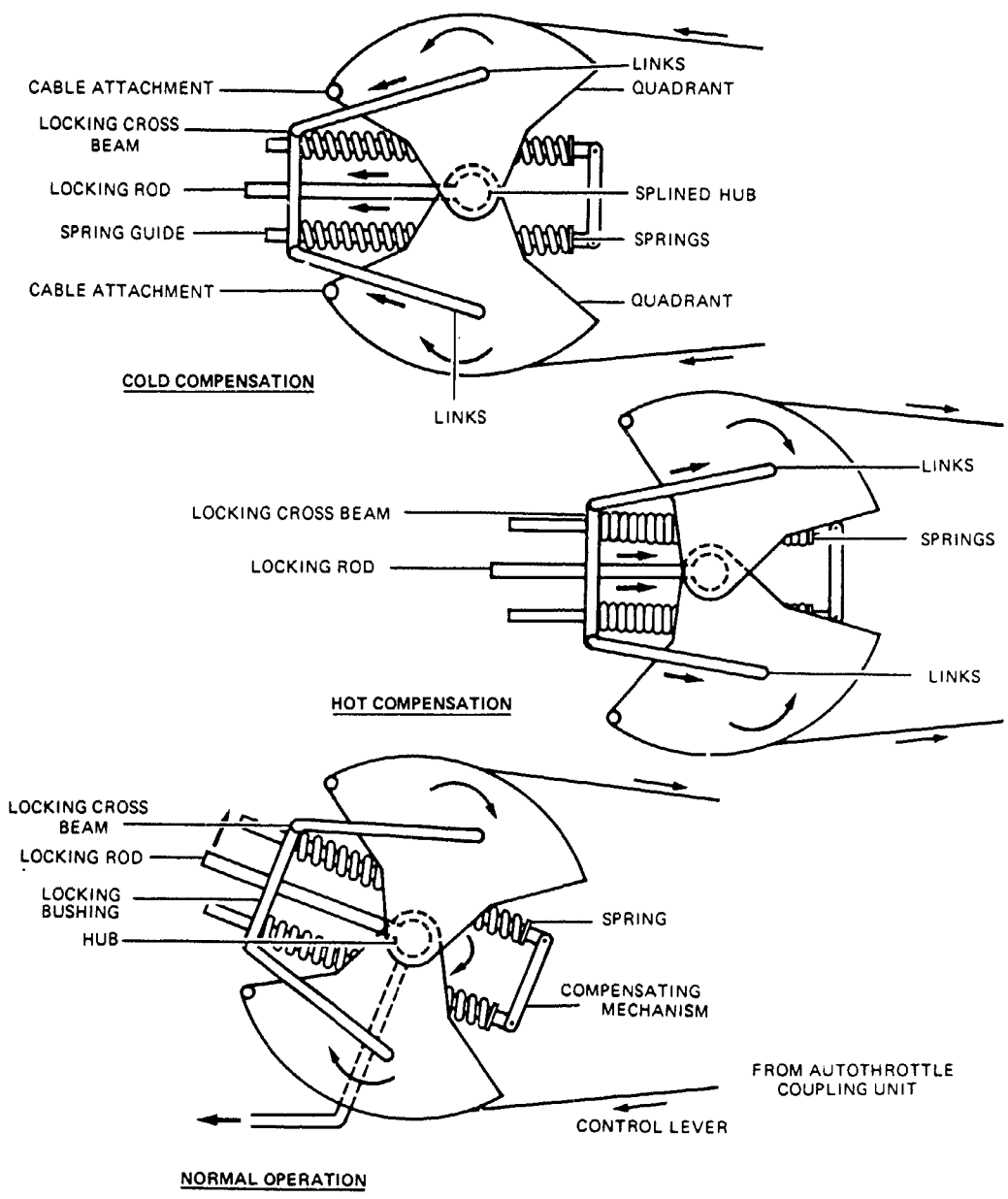
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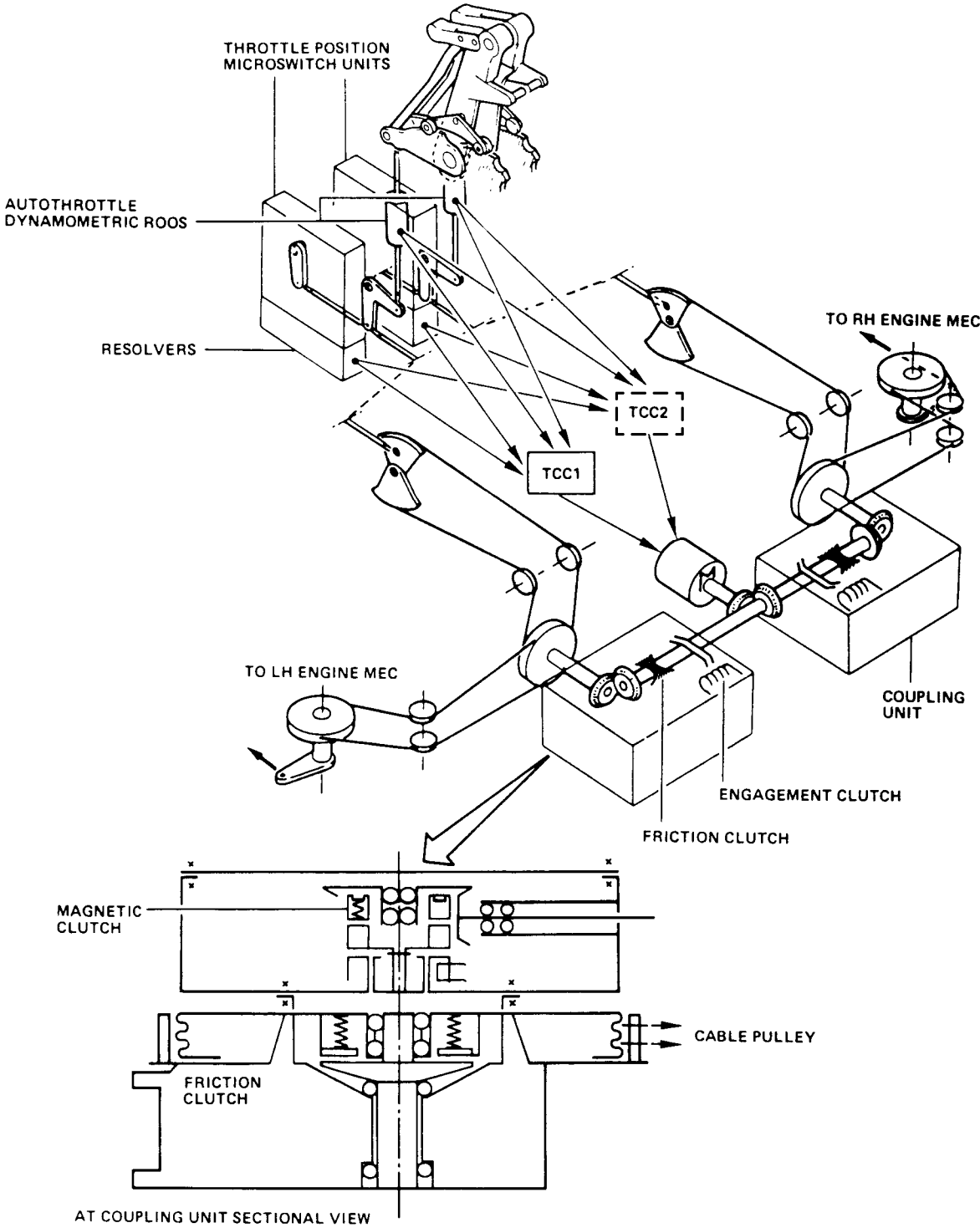


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Cable Tension Regulator - Operation Diagram  
Figure 005

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Autothrottle Coupling Unit Location  
Figure 006

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cable, controlling the displacement of the power lever on the MEC.

### (6) Power Lever on the MEC (Ref. Fig. 008)

The power lever on the MEC is controlled by a rack and pinion gearbox which in turn is actuated by the aircraft's push-pull cable routed around the compressor case right side.

The power lever acts inside the MEC upon the setting of N1 and N2 schedules.

The displacement of the governor pilot valve enables the fuel to act on the governor servo and thus on the fuel metering valve.

The power lever range is from 0° to 130°.

- In forward thrust

Displacement of the throttle control lever from 0° to FFT position, corresponds to a displacement of the power lever from 52° to 130°. A spring damps the throttle control lever at 52°.

- In reverse thrust

Displacement of the thrust reverser control lever from 0° to RFT position corresponds to a displacement of the power lever from 52° to 0°.

## B. Throttle Control Electrical System

### (1) Throttle Control Lever Microswitches

(Ref. Fig. 009)

Two microswitches are installed on the throttle control lever, one is controlled by a pushbutton and the other by a lever.

#### (a) Autothrottle instinctive disconnect pushbutton

Pressing one of the two pushbuttons sends an electrical signal which :

- disengages the autothrottle modes (N1, Speed, Mach, Retard) if they were engaged, without retarding the ATS arming lever to OFF position,
- displays MAN/THR to the PFD (Primary Flight Display),
- illuminates the MASTER caution light and triggers the single stroke chime.
- activates the L ECAM display unit which will indicate to the crew the actions to be taken.

#### (b) TO/GA levers

Pulling one of the two levers sends an electrical signal which :

- transmits to the AP, via the TCC1 (and TCC2 optional), a GA mode switch over command if the flaps are extended more than 8°,
- on the ground, after selection of Take Off or Flexible Take Off on the TRP, engages automatically the N1 mode,
- displays TO/GA on the PFD.

### (2) Dynamometric Rod

(Ref. Fig. 010)

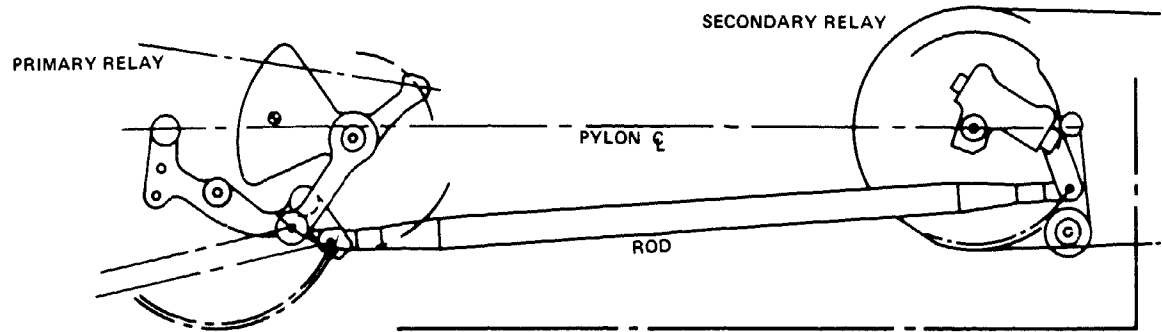
The dynamometric rods are located in the throttle control linkage. Each dynamometric rod comprises a load detector measuring the spring deformation.

Each dynamometric rod function is to send an electrical signal to each TCC, where the alternating signal is rectified and modifies the autothrottle clutching logic consequently.

When the pilot exerts an effort on the control lever, the clutch disconnects the servomotor from the control lever during the action, thus enabling throttle control lever adjustment without disengaging the

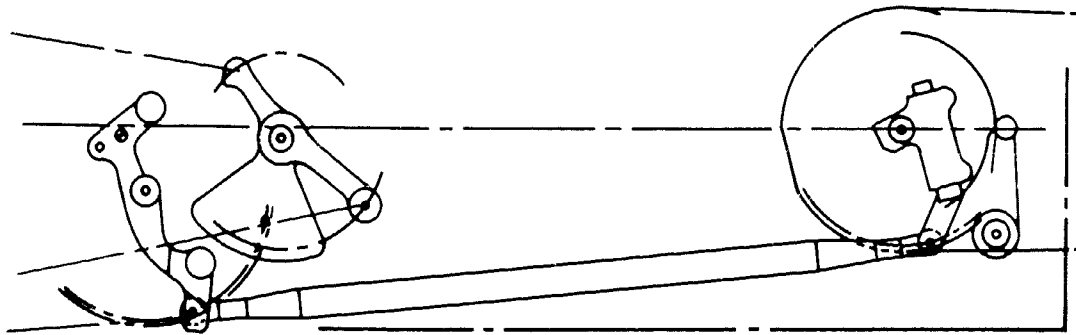
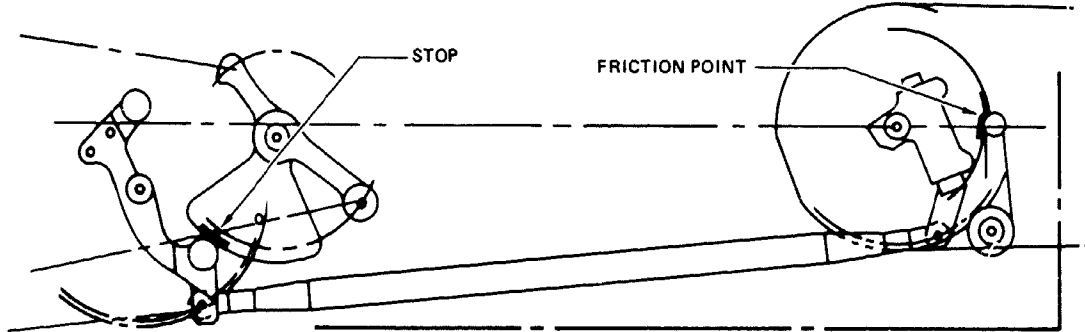
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INTERLOCK CONTROL RIG POSITION RFT  
POWER LEVER ANGLE : 0°



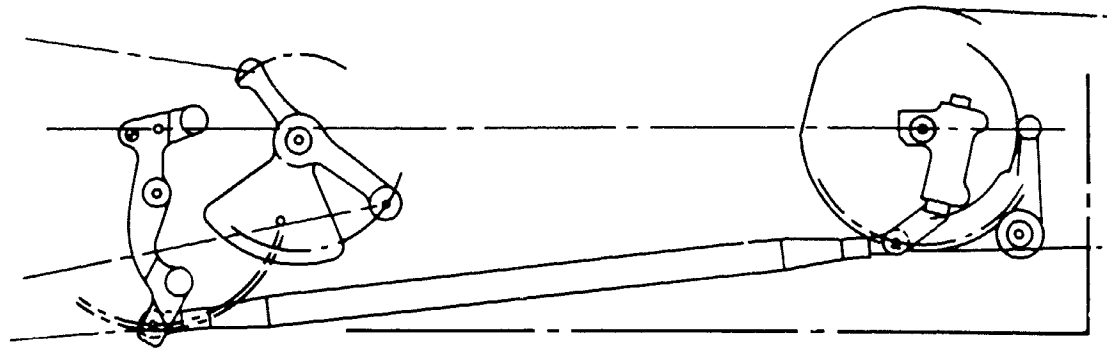
INTERLOCK STOP - REVERSE IDLE - P.L.A: 35°

FRICTION POINT - P.L.A : 42° 57' 14"

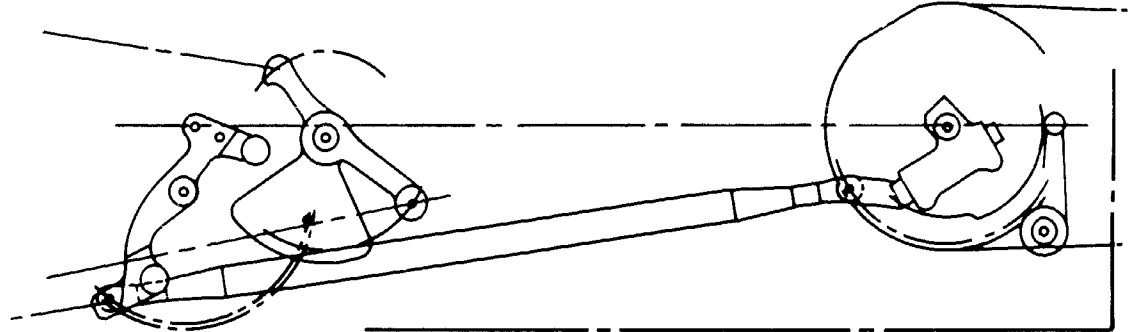


CONTROL RIG POSITION - IDLE TRIM - POWER LEVER ANGLE : 52°

CONTROL RIG POSITION - POWER LEVER ANGLE : 80°



FFT POWER LEVER ANGLE : 130°



LEGEND

- ⊙ STATIONARY HINGE PIN
- MOVABLE HINGE PIN
- ⊙ CONTROL RIG POSITION
- RFT REVERSE FULL THROTTLE
- FFT FORWARD FULL THROTTLE
- PLA POWER LEVER ANGLE

| POSITION                    | POWER LEVER ANGLE | PRIMARY RELAY ANGLE | SECONDARY RELAY ANGLE | TLA POSITION (TOLERANCES) |
|-----------------------------|-------------------|---------------------|-----------------------|---------------------------|
| REVERSE FULL THROTTLE       | 0°                | 21°31'19"           | 5°02'31"              | 0° (0°-2°)                |
| STOP                        | 35°               | 54°38'10"           | 36°38'20"             | 0° (0°-2°)                |
| FRICTION POINT              | 42°57'14"         | 60°44'10"           | 42°58'31"             | 0° (0°-2°)                |
| IDLE TRIM                   | 52°               | 67°23'10"           | 50°                   | 0° (0°-2°)                |
| ENGINE CONTROL RIG POSITION | 80°               | 86°57'43"           | 71°28'30"             | 14° (13°50'-15°50')       |
| FWD FULL THROTTLE           | 130°              | 125°06'18"          | 123°08'38"            | 49° (46°-52°)             |

Primary and Secondary Relay - Operating Principle  
Figure 007

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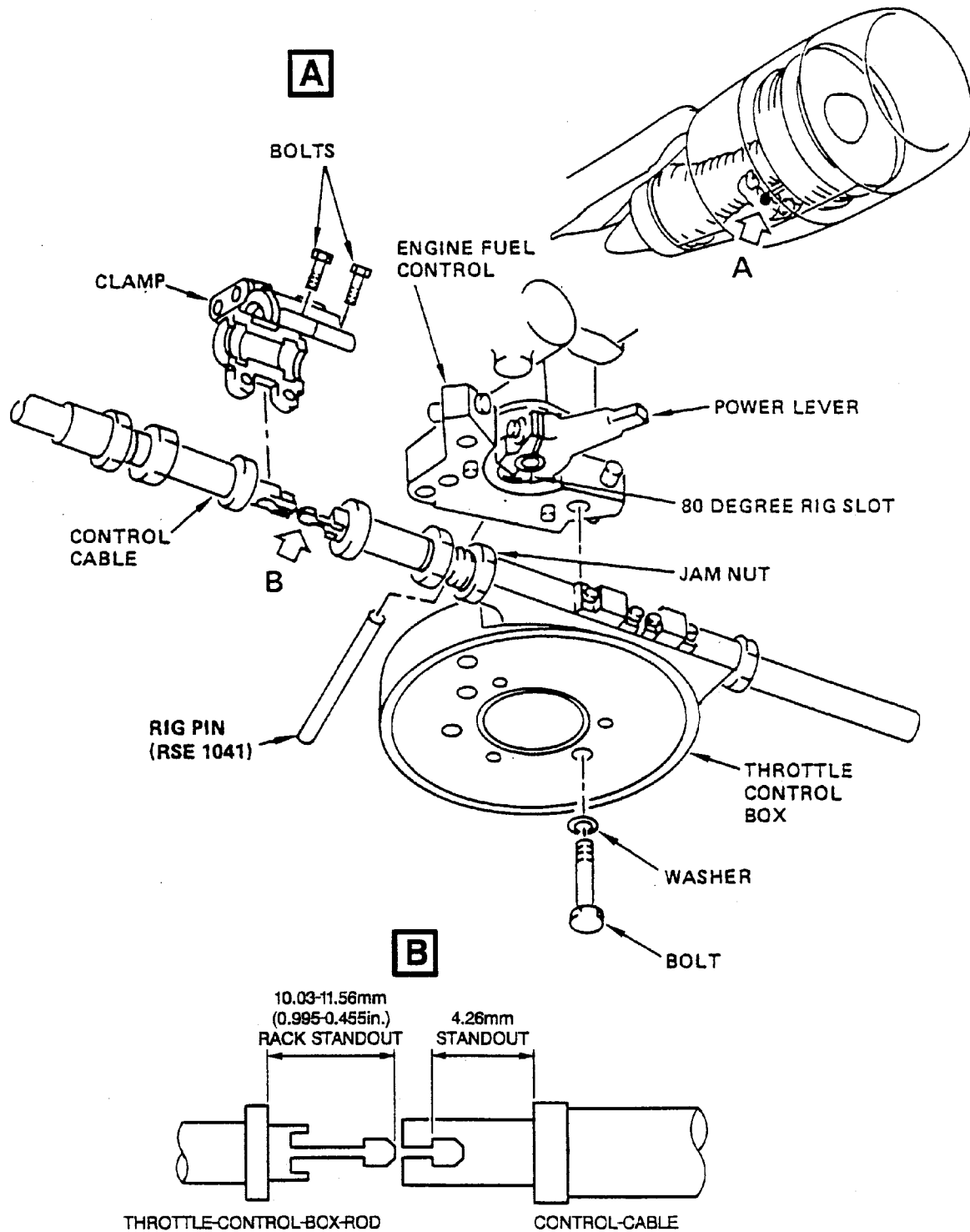
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Engine Control System  
Figure 008

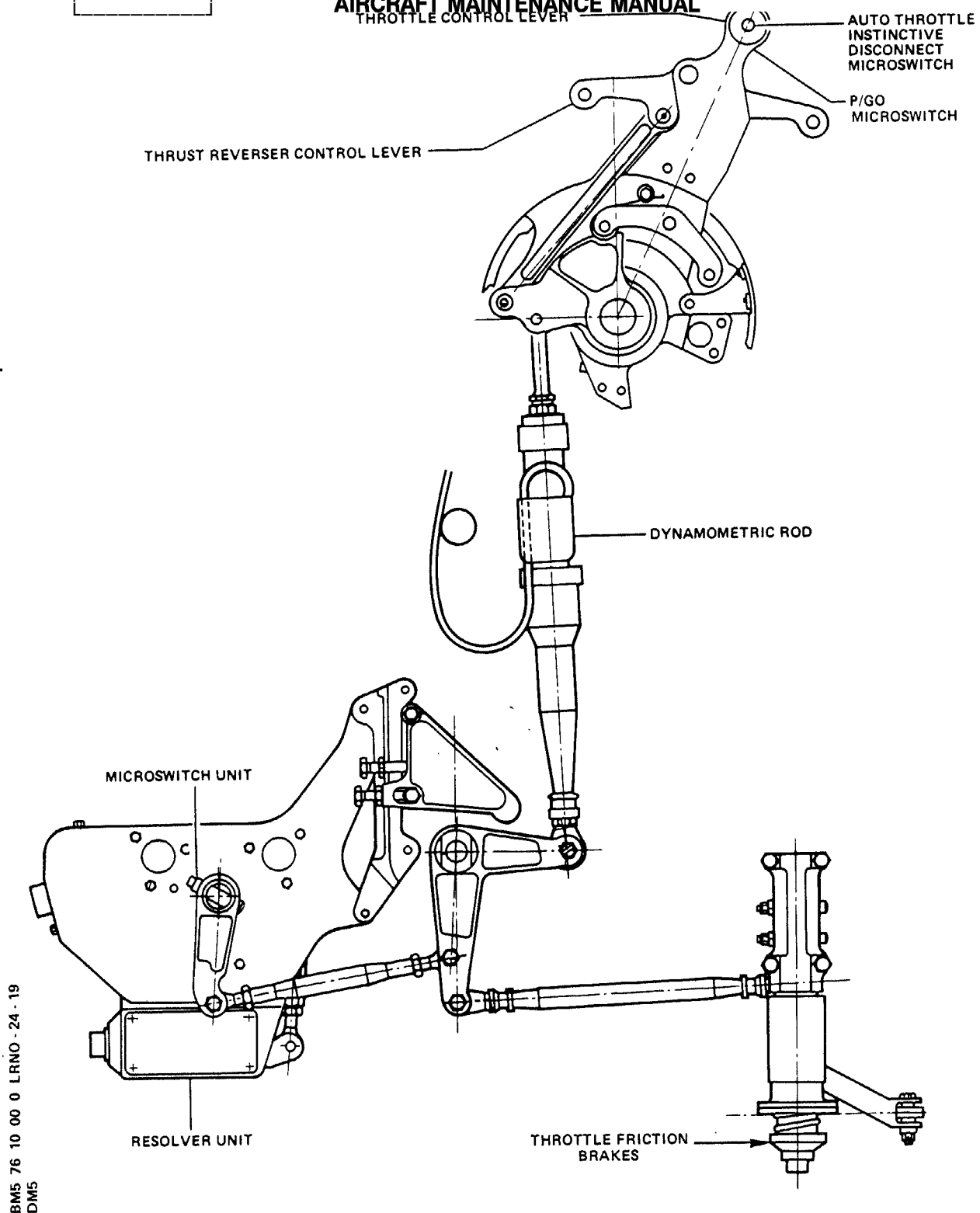
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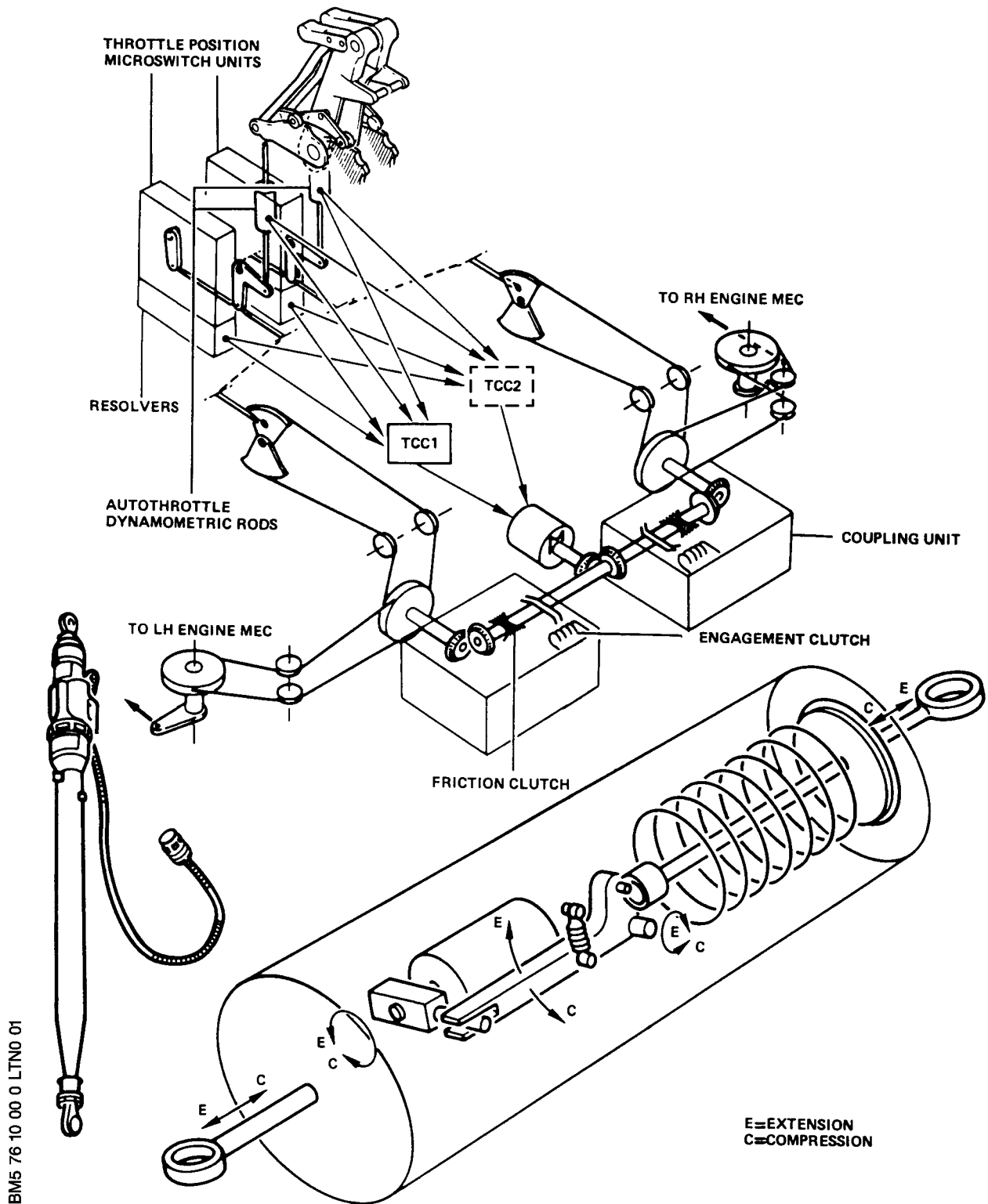
Electrical Components of Throttle Control Lever  
Figure 009

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Autothrottle Dynamometric Rods  
Figure 010

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system.

Special Case : If the LEVEL CHANGE mode is active and the pilot exerts an effort on one or the other throttle control lever during the retard phase, both control levers are declutched and remain so until another mode is selected.

NOTE : The rods can be locked in the unloaded position so that throttle control adjustment can be performed.

### (3) Microswitch Unit

(Ref. Fig. 011)

Each throttle control lever acts upon the contacts of a microswitch unit (112VU on the RH side and 113VU on the LH side) used to detect the position of the throttle control lever in the different flight phases. The microswitch units are located in the center pedestal, under the flight compartment floor.

Each microswitch unit consists of five microswitches :

- 113VU (9CS, 51CS, 45HM, 13KM, 7KM)
- 112VU (8CS, 52CS, 44HM, 14KM, 8KM)

#### (a) Microswitches 9CS, 51CS (8CS, 52CS)

When these two microswitches are activated at 10° throttle control lever, the spoilers may be extended.

#### (b) Microswitch 45HM (44HM)

On the ground :

- when one throttle control lever reaches 22° increasing and that one of the LH or RH microswitch is activated, the cabin may be pressurized at take off.
- when both throttle control levers reach 22° decreasing and that both LH and RH microswitches are activated, the cabin may be depressurized at landing (opening of the four outflow valves).

#### (c) Microswitches 13KM, 7KM (14KM, 8KM)

- Thrust reverser control

On the ground, thrust reverser control lever microswitch 13KM (14KM) and thrust reverser control lever microswitch 7KM (8KM) activations enable respectively, energization of the directional pilot valve solenoid and opening of the HP bleed control valve and pressure regulating and shut off valve. The air is then supplied to the pneumatic drive motor operating the ballscrew actuators in the stowed or deployed direction.

### (4) Throttle Position Detector

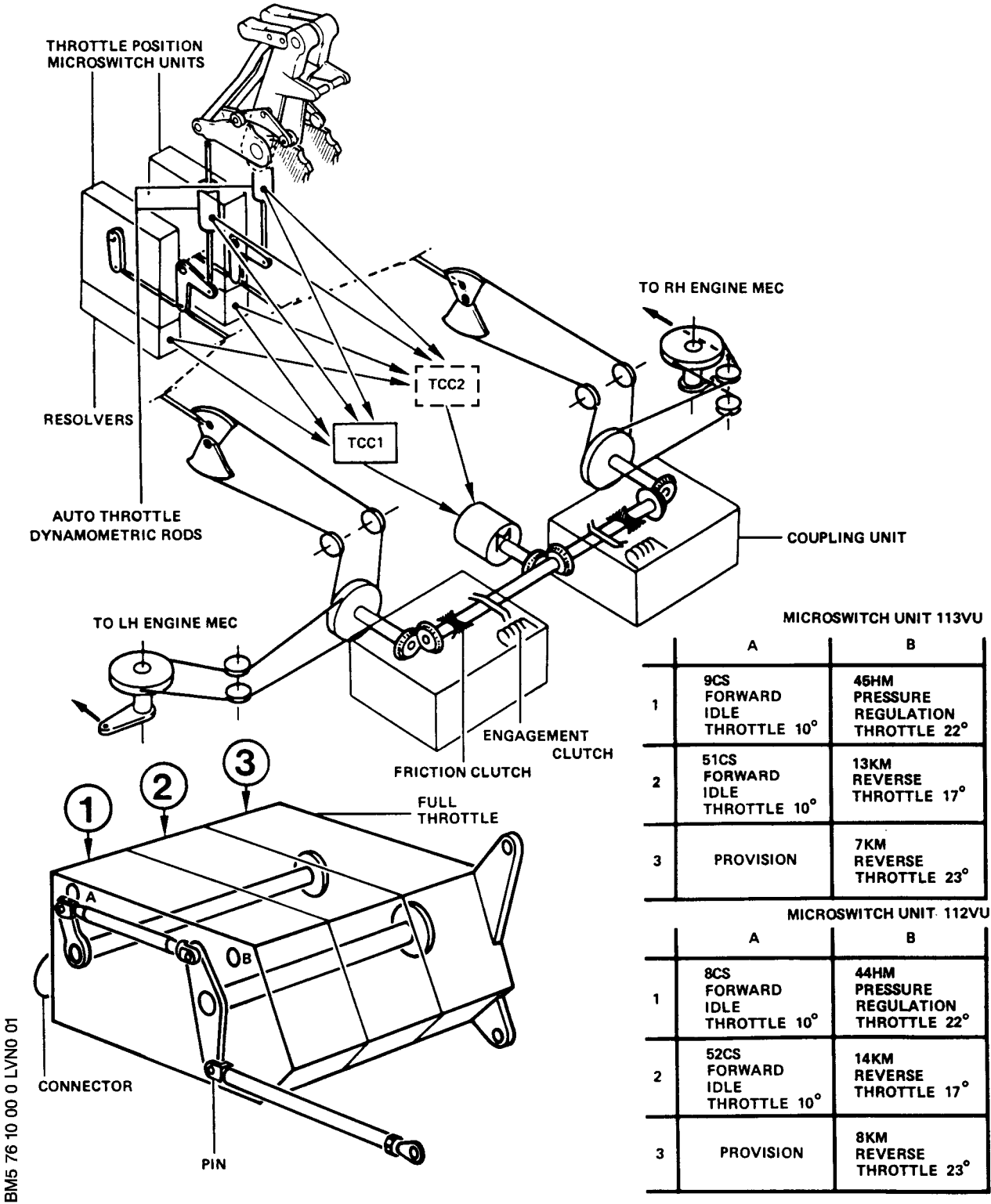
(Ref. Fig. 012)

The position of each throttle control lever is transmitted to the TCC1 (and TCC2 optional) and corresponding PMC and via a unit located under the microswitch unit.

The LH throttle control lever drives microswitch unit 113VU and the resolvers of position detector 313CJ while the RH throttle control lever movement is transmitted to microswitch unit 112VU and position detector 314CJ.

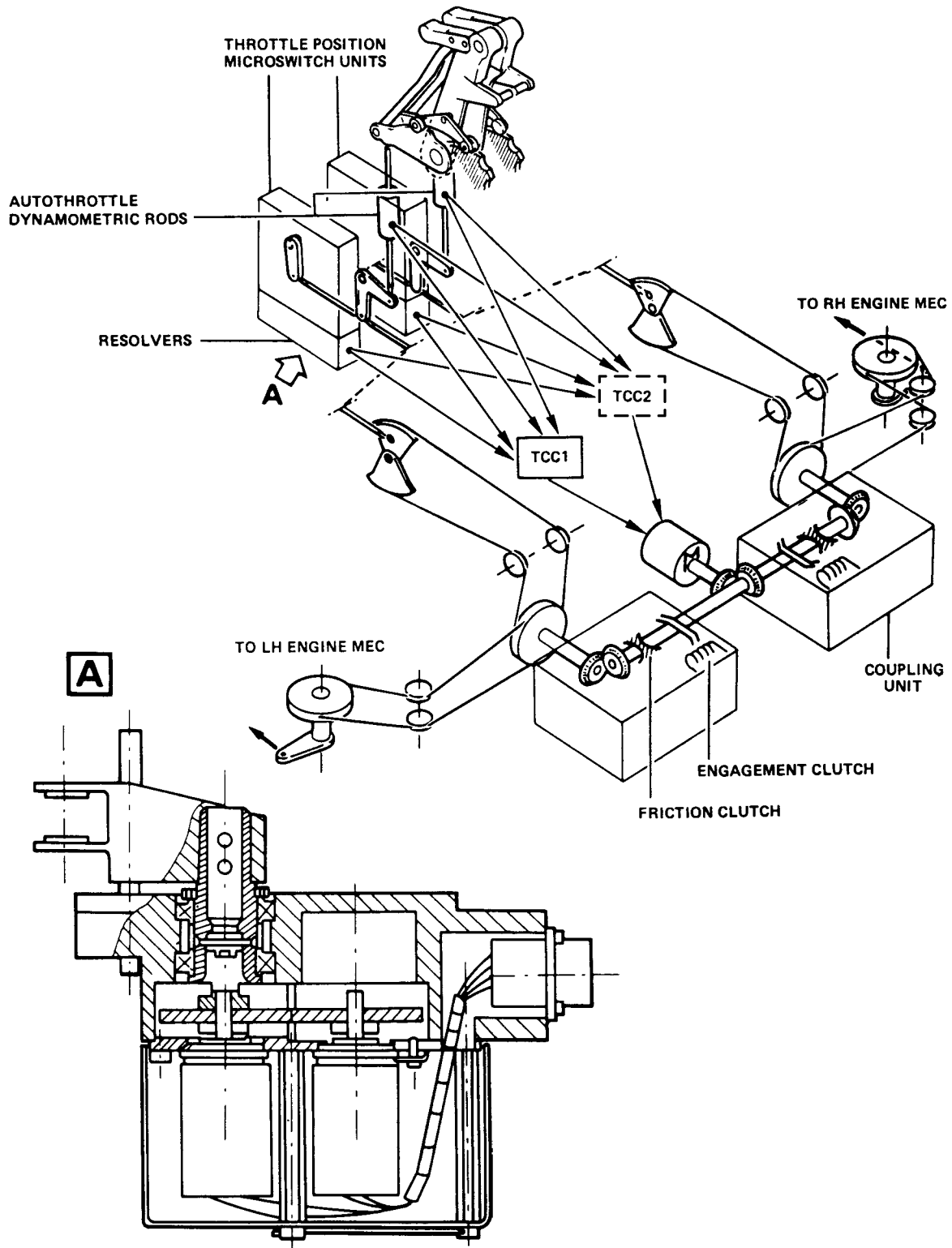
The throttle position detector comprises two resolver type sensors with rotary transformers :

- the first resolver is directly connected to the input lever and transmits the throttle control lever position to the corresponding PMC.
- the second resolver receives the movement transmitted by the first



Throttle Position Microswitch Units

Figure 011



Resolvers  
Figure 012

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resolver thru a gear assembly composed to two identical gears (step-up ratio = 1) and transmits the throttle position to the TCCs.

### 3. HP Fuel Shut Off Valve Control (Ref. Fig. 013, 014)

The HP fuel shut off valve control is electric.

When the HP fuel shut off valve control lever, located on the flight compartment center pedestal panel 9VU, is placed in ON position, the selected engine ignition circuits are energized and an electrical signal is sent to the main engine control (MEC). This signal energizes a solenoid valve. The fuel shut off valve is opened by energizing an opposing solenoid. Permanent magnets within valve housing retain the fuel shut off valve position during engine power off and emergency shut downs.

Wiring to the valve in the MEC is fire resistant.

The HP fuel shut off valve has also a pressurizing function which is to keep the fuel supply pressure to a satisfactory value to ensure correct spray of fuel by nozzles in all operating configurations.

#### A. Opening of the HP Fuel Shut Off Valve

Setting of HP fuel shut off valve control lever 7KC (8KC) to ON, results in :

- de-energization of relays 13KC (14KC) and 19KC (18KC) and energization of timing relay 31KC (30KC)
- energization of the selected engine ignition circuit (circuit JH)
- energization of relay 27KC (26KC) which closes and supplies the solenoid in the opening mode. When the HP fuel shut off valve is fully open, the microswitch on the OPEN section closes, thus energizing relay 29KC (28KC), de-energizing timing relay 31KC (30KC) and relay 27KC (26KC).

#### B. Closure of the HP Fuel Shut Off Valve

Setting of the HP fuel shut off valve control lever 7KC (8KC) to OFF, results in :

- de-energization of relay 29KC (28KC) and energization of timing relay 31KC (30KC)
- de-energization of the selected engine ignition circuits (circuit JH)
- energization of relay 27KC (26KC), which supplies the solenoid in the closure mode. When the HP fuel shut off valve is fully closed, the microswitch on the SHUT section closes, which energizes relays 13KC (14KC) and 19KC (18KC) again, and de-energizes timing relay 31KC (30KC) and relay 27KC (26KC). Amber MASTER CAUTION light is then triggered.

#### C. Fuel Shut Off Valve in Transit

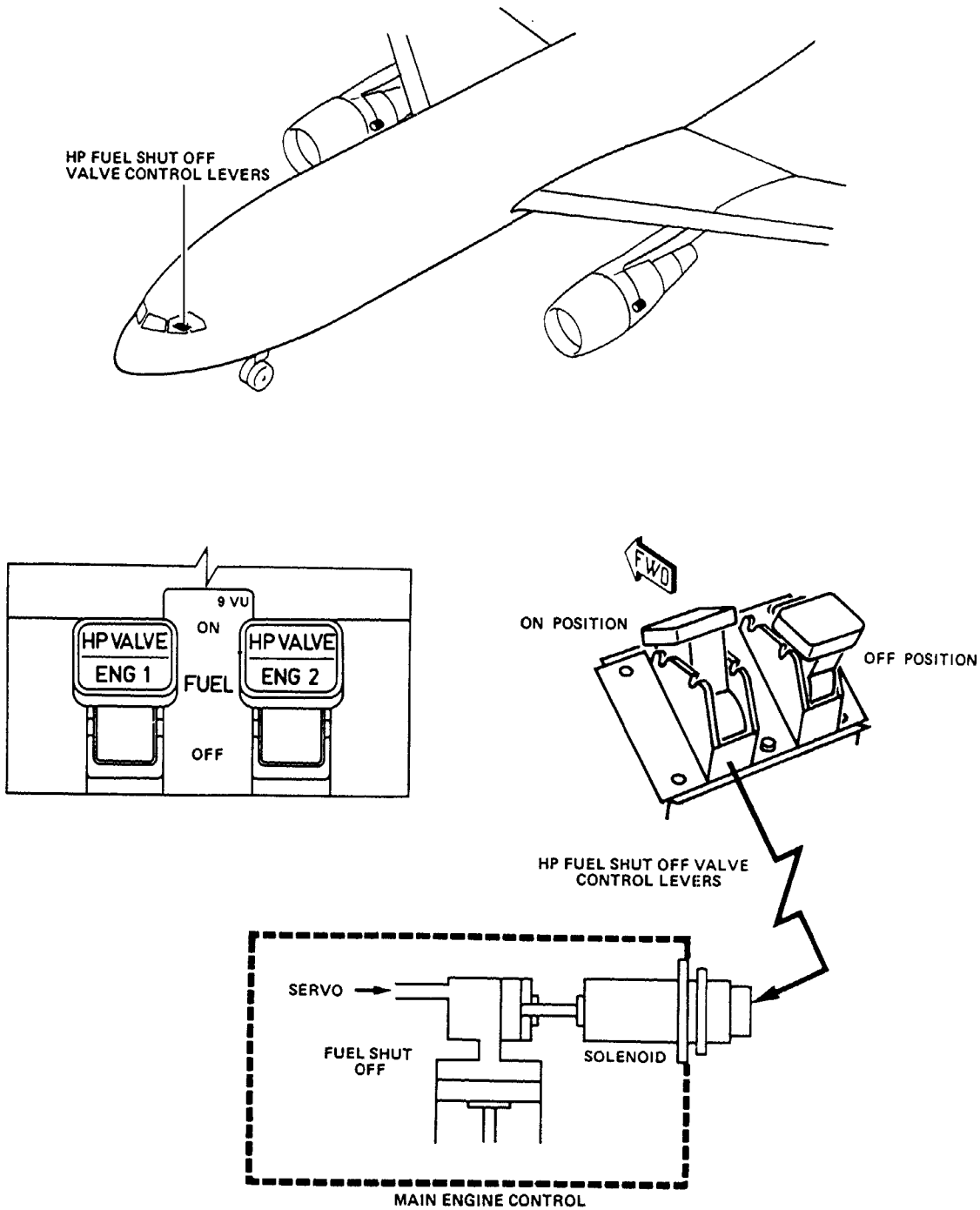
In this case, relays 13KC (14KC), 29KC (28KC) and 19KC (18KC) are de-energized, thus permitting energization of timing relay 31KC (30KC).

If the HP fuel shut off valve remains in an intermediate position for more than three seconds relay 31KC (30KC) closes and the red ENG1 HP VALVE (ENG2 HP VALVE) comes on.

#### D. Engine Fire

##### (1) HP fuel shut off valve open

In this case, relay 19KC (18KC) is de-energized. In case of engine fire, relay 17KC (12KC) is energized and triggers the red ENG1 HP VALVE (ENG2



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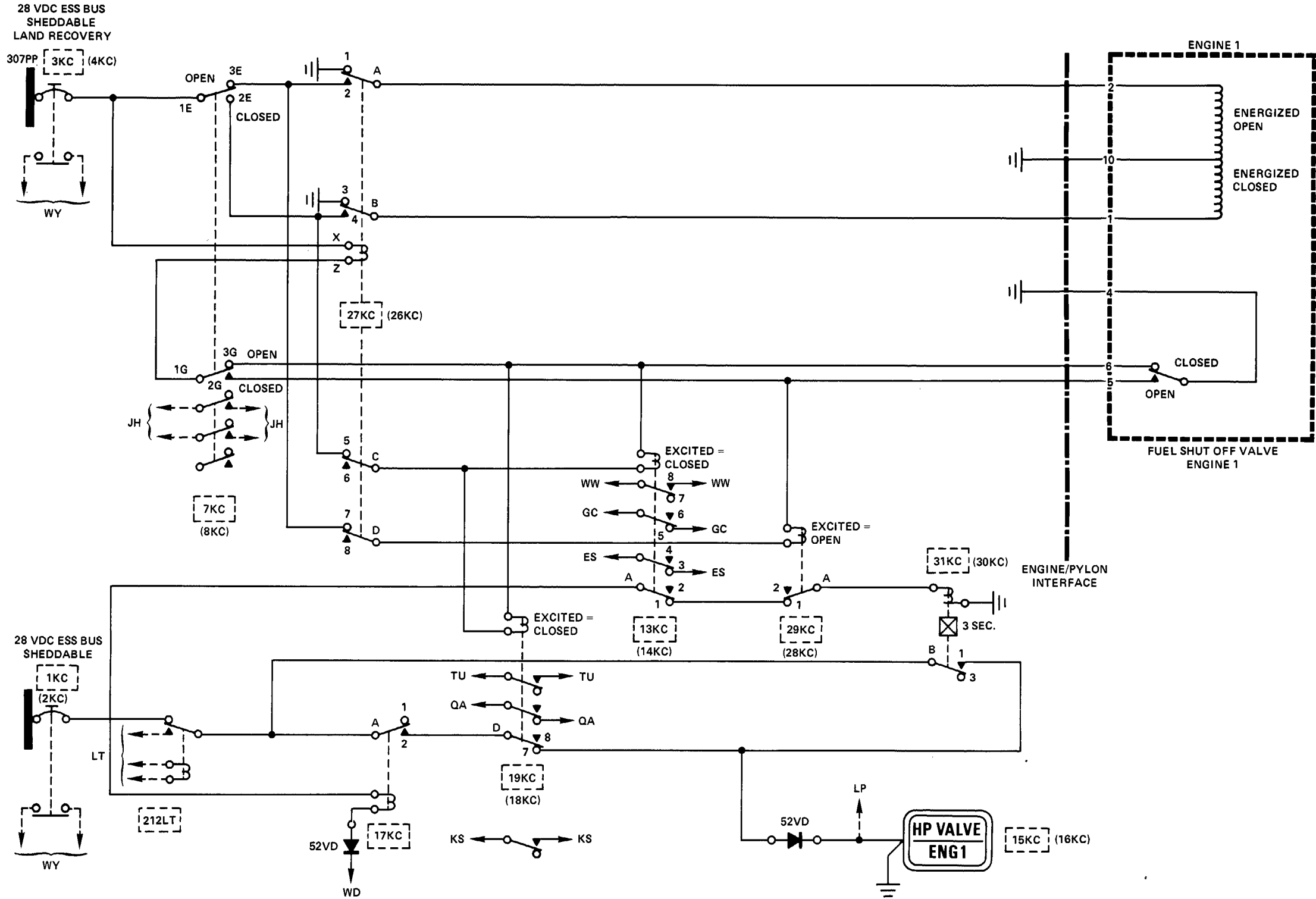
HP Fuel Shut Off System  
Figure 013

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HP Fuel Shut Off Control - Eng 1  
Figure 014

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HP VALVE) warning light.  
(2) HP fuel shut off valve closed  
In this case, relay 19KC (18KC) is energized and closes, cutting off  
supply to ENG1 HP VALVE (ENG2 HP VALVE) warning light.

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## THROTTLE CONTROLS - REMOVAL/INSTALLATION

**NOTE :** Removal/installation procedures for engine 1 and engine 2 throttle control linkage being identical, only engine 1 removal/installation is described.

### 1. Equipment and Materials

| ITEM                       | DESIGNATION                                                            |
|----------------------------|------------------------------------------------------------------------|
| A.                         | Access Platforms                                                       |
| B. 99A76101003000          | Pin-Rigging, Microswitch Unit                                          |
| C. 98A27901005000          | Pin-Rigging, Cable Tension Regulator                                   |
| D. 98A76101003000          | Pin-Rigging, Autothrottle Coupling Unit                                |
| E. 98A76103000000          | Bar Tool-Locking, Throttle Control Cable Tension Regulator 0° position |
| F. 99A76101501000          | Pin-Rigging, Primary Transmission Crank Lever                          |
| G.                         | Circuit Breaker Safety Clips                                           |
| H. 98A27503003000          | Guard, Safety - Flap/Slat Control Lever                                |
| I.                         | Cotter Pins                                                            |
| J.                         | Safety Clips-Turnbuckle                                                |
| K.                         | Ambient Thermometer                                                    |
| L.                         | Warning Notices                                                        |
| Referenced Procedures      |                                                                        |
| - 76-11-23, P. Block 401   | Cable Tension Regulator                                                |
| - 76-11-00, P. Block 501   | Throttle Controls                                                      |
| - 76-11-33, P. Block 401   | Primary Transmission Crank Lever                                       |
| - 76-11-31, P. Block 401   | Secondary Transmission                                                 |
| - 76-11-24, P. Block 401   | Throttle Control Pressure Seals                                        |
| - 20-29-00, P. Block 1     | System Cabling                                                         |
| - 24-41-00, P. Block 301   | AC External Power Control                                              |
| - 29-21-00, P. Block 301   | Green Auxiliary Power                                                  |
| R - 22-33-28, P. Block 401 | ATS Coupling Unit                                                      |
| - 36-11-00, P. Block 401   | Engine Bleed Air Supply System                                         |

**CAUTION :** BEFORE ATTEMPTING ANY MAINTENANCE OPERATION ON THROTTLE CONTROLS, OPEN, SAFETY AND TAG THE FOLLOWING CIRCUIT BREAKERS :

| PANEL | SERVICE                           | IDENT. | LOCATION |
|-------|-----------------------------------|--------|----------|
| 21VU  | AFS/TCC/SYS1/28VDC                | 306CJ1 | 102/H 8  |
| 21VU  | AFS/TCC/SYS1/115VAC               | 308CJ1 | 102/H 9  |
| 21VU  | AFS/TCC/SENSOR                    | 305CJ1 | 102/H10  |
| 21VU  | AFS/TCC/SYS2/115VAC               | 308CJ2 | 102/H11  |
| 21VU  | AFS/TCC/SYS2/28VDC                | 306CJ2 | 102/H12  |
| 133VU | ENGINES/ENG2/REVERSE/CTL          | 2KM    | 331/V74  |
| 133VU | ENGINES/ENG1/REVERSE/CTL          | 1KM    | 332/U69  |
| 133VU | ENGINES/ENG1 & 2/IGNITION/SYS B   | 2JH    | 333/T72  |
| 133VU | ENGINES/ENG1 & 2/IGNITION/SYS A   | 1JH    | 334/S72  |
| 133VU | ENGINES/ENG1 & 2/START/CTL & WARN | 1KG    | 335/R68  |

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## 2. Throttle Control Linkage

### A. Job Set-Up

- (1) In flight compartment, place warning notices on panels 429VU and 9VU and on throttle control levers which are in Forward Idle Throttle position.
- (2) In avionics compartment, open access door 121BL.
- (3) Install rigging pin 99A76101003000 in microswitch unit 113VU (112VU).  
If rigging pin cannot be inserted, adjust length of dynamometric rod until it is possible (Ref. 76-11-00, P. Block 501).
- (4) On cable tension regulator install locking tool 98A76103000000. Adjust length of adjustable rod if necessary until tool installation is possible (Ref. 76-11-00, P. Block 501).  
Keep tool in its housing.

### B. Removal (Ref. Fig. 401)

- (1) Unsafety and remove nuts (1) and (9), remove washers (2) and (8), bolts (4) and (7) and disassemble rod (5) from lever (3) and throttle friction brakes (6).
- (2) Unsafety and remove nuts (12) and (18), remove washers (11) and (17), bolts (10) and (23). Pivot lever (6) to disassemble rod (24).
- (3) Unsafety and remove nuts (16) and (21), remove washers (15) and (20), bolts (13) and (19). Pivot lever (22) to disassemble rod (14).

### C. Preparation of Replacement Component

- (1) Make certain that components are clean and free from nicks or corrosion.

### D. Installation (Ref. Fig. 401)

- (1) Install the two ends of rod (14) and (24) in levers (6) and (22). Install bolts (13), (19), (23) and (10), washers (15), (20), (17) and (11), nuts (16), (21), (18) and (12). Tighten and safety with new cotter pins.
- (2) Install rod (5) in lever (3) and (6). Install bolts (4) and (7), washers (2) and (8), nuts (1) and (9). Tighten and safety with new cotter pins.

### E. Adjustment/Test

Refer to 76-11-00, P. Block 501.

### F. Close-Up

- (1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
- (2) Remove warning notices.
- (3) Close avionics compartment access door 121BL.
- (4) Remove safety clips and tags and close circuit breakers 306CJ1, 308CJ1, 305CJ1, 308CJ2, 306CJ2, 1JH, 2JH, 1KG, 1KM and 2KM.

## 3. Throttle Controls in Fuselage

### A. Job Set-Up

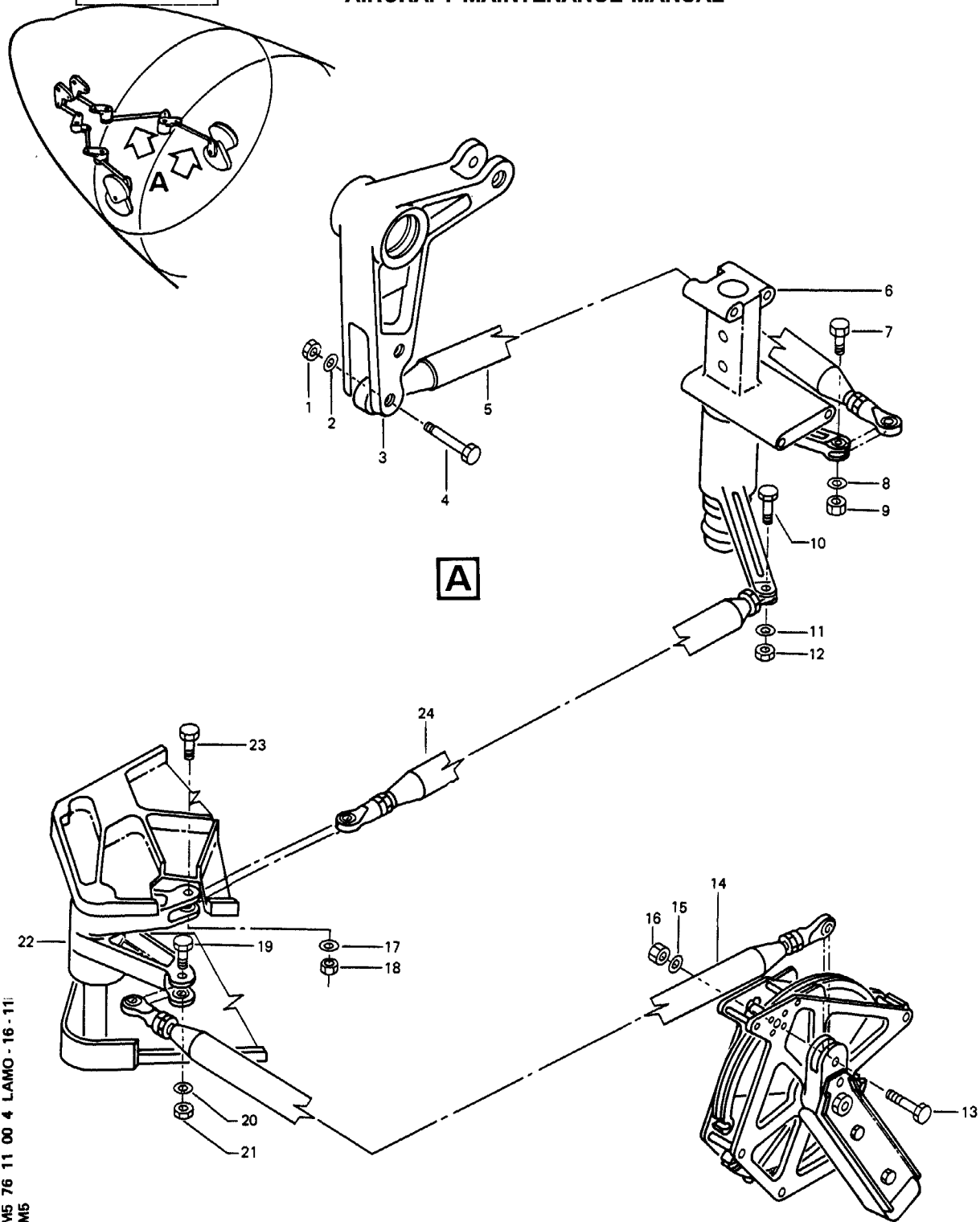
- (1) In flight compartment, place warning notices on panel 429VU and on throttle control levers which must be in Forward Idle Throttle position.
- (2) Install access platform at FWD cargo compartment door and open door.
- (3) Open avionics compartment access door 121BL.

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Throttle Control Linkage  
Figure 401

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- (4) Remove cargo compartment ceiling panels giving access to cable routing concerned.
- (5) Install rigging pin 98A27901005000 in cable tension regulator.
- (6) Install rigging pin 98A76101003000 in autothrottle coupling unit pulley.

### B. Removal (Ref. Fig. 403, 402)

- (1) Remove and discard safety clips (1) from turnbuckles (2). Gradually loosen turnbuckle (2) barrels until installation of locking tool 98A76103000000 on cable tension regulator is possible.
- (2) Remove and retain turnbuckle (2) barrel of cable to be removed. Stow on structure the sections of cable remaining on aircraft.
- (3) Unsafety and remove nuts (3), bolts (8) and fairleads assembly (4), (9) and (10).
- (4) Remove nuts (5) and fairleads assembly (6) and (7).
- (5) Remove casing (18) and (19) from cable tension regulator (15) then fairleads (16) and (17) (Ref. 76-11-23, P. Block 401).  
Free end of cable to be removed from its recess in regulator quadrant (15).
- (6) Remove cable run (13) or (14) as required.
- (7) Remove and retain fairleads from ATS coupling unit.
- (8) Disengage and remove cable run (11) or (12) as required.

### C. Preparation of Replacement Component

- (1) Check linkage components for correct condition and security of attachment. Check pulleys, cables and push-pull cables for traces of wear, corrosion or rubbing. Check cables (Ref. 20-29-00, P. Block 1).

### D. Installation (Ref. Fig. 403, 402)

- (1) Install cable run (11) or (12) in its recess in ATS coupling unit.  
Install fairleads on ATS coupling unit.
- (2) Install end of cable (13) or (14) into its recess in regulator quadrant (15).
- (3) Hold end of cable to be installed in its recess and install fairlead (16) then (17).  
Install casings (18) and (19) (Ref. 76-11-23, P. Block 401).
- (4) Engage cable (13) and (14) to be installed in fairleads (4), (9), (10), (6) and (7). Tighten bolts (8), nuts (3) and (5). Safety nuts (3) with new cotter pins and bolt (8) with lockwire.
- (5) Engage at the same time threaded ends of the two cable runs to be assembled in turnbuckle (2) barrel. Slightly tighten turnbuckle (2).

### E. Adjustment/Test

Refer to 76-11-00, P. Block 501.

### F. Close-Up

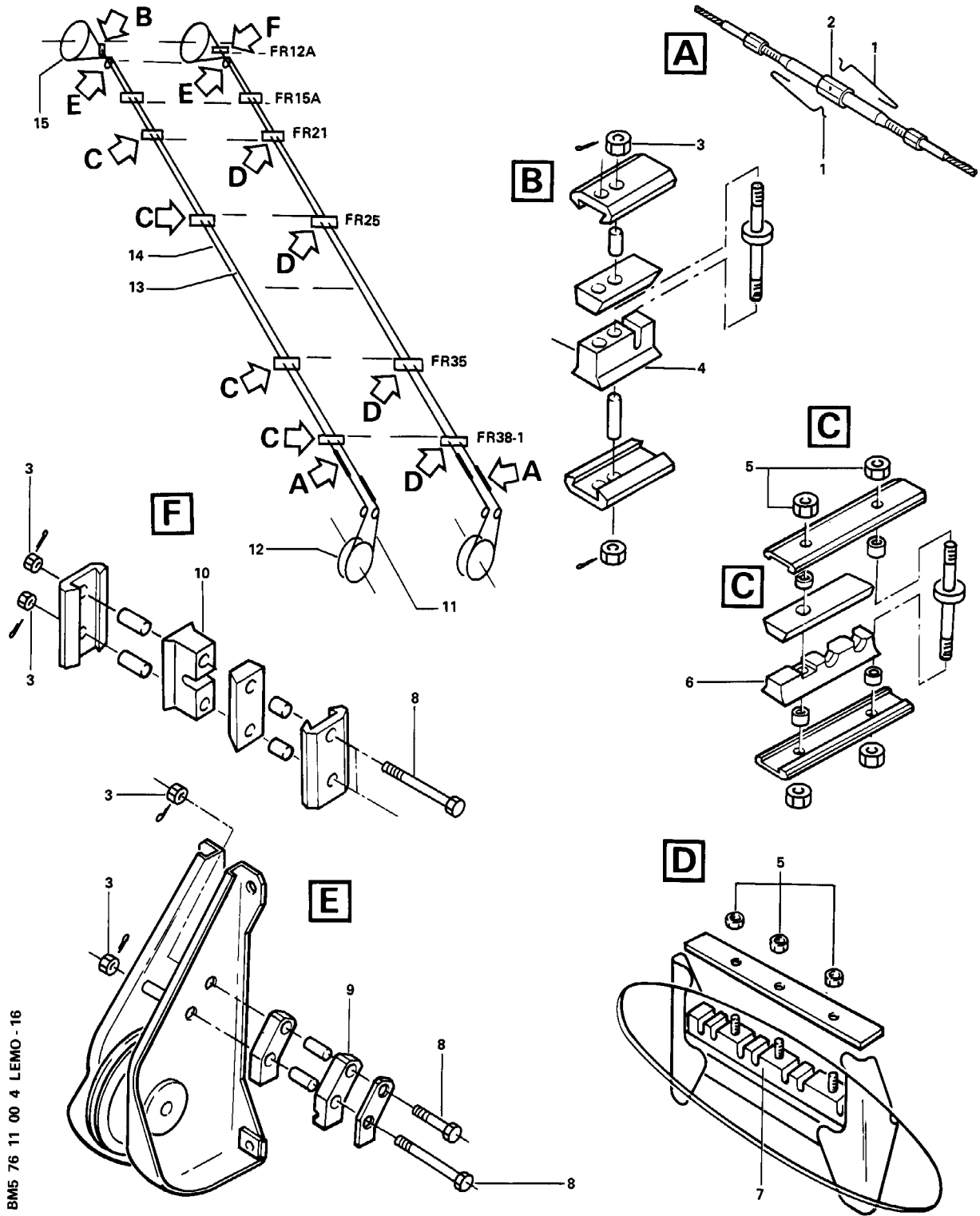
- (1) Safety turnbuckles (2) with new safety clips item I
- (2) Install cargo compartment ceiling panels.
- (3) Remove rigging pins 98A27901005000 and 98A76101003000.
- (4) Close avionics compartment access door.
- (5) Make certain that working area is clean and clear of tools and

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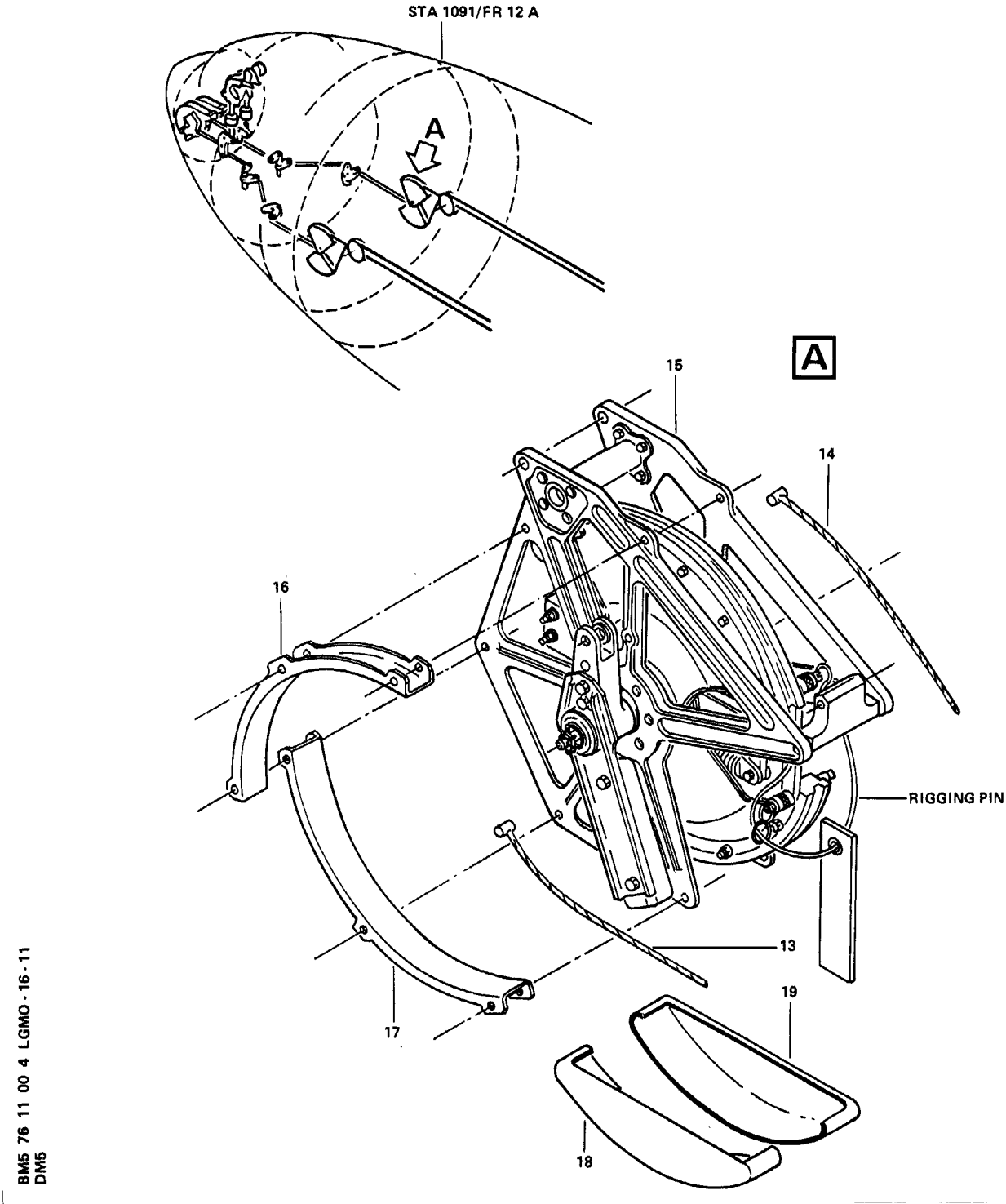
Throttle Controls in Fuselage  
Figure 402

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miscellaneous items of equipment.

(6) Remove access platform.

(7) Remove safety clips and tags and close circuit breakers 306CJ1, 308CJ1, 305CJ1, 308CJ2, 306CJ2, 1JH, 2JH, 1KG, 1KM and 2KM.

### 4. Throttle Control in Wings

#### A. Job Set-Up

(1) In flight compartment, place warning notices on panel 429VU and throttle control levers which must be in Forward Idle Throttle position.

(2) Position access platforms at wing and FWD cargo compartment.

(3) In FWD cargo compartment, at STA2294 (FR40/41) remove panel 131SW (132SW) giving access to turnbuckles.

(4) Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

(5) Make certain that electronic racks ventilation is correct.

(6) Pressurize Green hydraulic system by means of electric pumps (Ref. 29-21-00, P. Block 301).

(7) Place flap and slat control lever in notch 2 to extend slats.

Install locking tool 98A27503003000 on flap and slat control lever.

(8) Cut-off electrical supply to electric pumps and electrical ground power unit (Ref. 24-41-00, P. Block 301).

Display warning notice prohibiting use of HP ground air supply connections.

(9) At engine pylon, open access doors 471AL, 472AR, 415AL and 416AR (481AL, 482AR, 425AL and 426AR).

(10) At wings, open the following skin panels and access doors :

- upper surface : 471AT (481AT), 512AT (612AT) and if necessary 513AT (613AT)

- lower surface : 512AB, 512BB, 512CB, 512DB, 512EB, 512FB, 512GB, 512HB, 512JB and 512KB (612AB, 612BB, 612CB, 612DB, 612EB, 612FB, 612GB, 612HB, 612JB and 612KB).

(11) Remove air bleed duct in engine pylon (Ref. 36-11-00, P. Block 401) and blank off open duct ends on aircraft.

(12) On ATS coupling unit (1), make certain that rigging pin 98A76101003000 slides freely in its housing. If not, adjust cable tension to achieve this condition (Ref. 76-11-00, P. Block 501).

R (13) Remove ducts located between RIB8 and RIB10 (Ref. 36-11-00,  
R P. Block 401). Blank off open duct ends on aircraft.

#### B. Removal (Ref. Fig. 405, 404)

(1) Remove and discard safety clips (14) from turnbuckles (13) gradually loosen turnbuckle barrels until installation of rigging pin 99A76101501000 on primary transmission (5) is possible.

(2) Remove and retain turnbuckle barrels (13). Stow on structure the sections of cable remaining on aircraft.

(3) Remove pressure seals (3) (Ref. 76-11-24, P. Block 401). Pass ends of cable (4) through pressure seal holes.

(4) In wings, remove fairleads (31) and (34).

Free cables from pulleys (32) and (33).

(5) Remove nuts (7) and (9) fairlead assembly (8), (10), (11) and (12). Remove cables.

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- (6) Remove attach bolt (19). Disassemble flanges (15) and (17) and free cables from halves of fairleads (18) and (16). Remove cables.
- (7) Remove bolts (35) and fairlead (36). Free cables from pulleys (37) and (38).
- (8) Remove fairlead (39) and spacer. Free cable from pulley (40).
- (9) Remove fairleads (42) and spacers. Free cable from pulley (41).
- (10) In engine pylon. Remove two fairleads (48), free cables from pulleys (44) and bracket (45).
- (11) On secondary transmission pulley (46) remove cover (43) and fairlead (47) (Ref. 76-11-31, P. Block 401).  
Remove cable entirely.
- R (12) On autothrottle coupling unit (1), remove fairleads (Ref. 22-33-28, P. Block 401). Free and remove cables (2) and (6) from pulley.

**C. Preparation of Replacement Component**

- (1) Check linkage components for correct condition and attachment. Check pulleys, cables and push-pull cables for traces of wear, corrosion or rubbing. Check cables (Ref. 20-29-00, P. Block 1).

**D. Installation (Ref. Fig. 405, 404)**

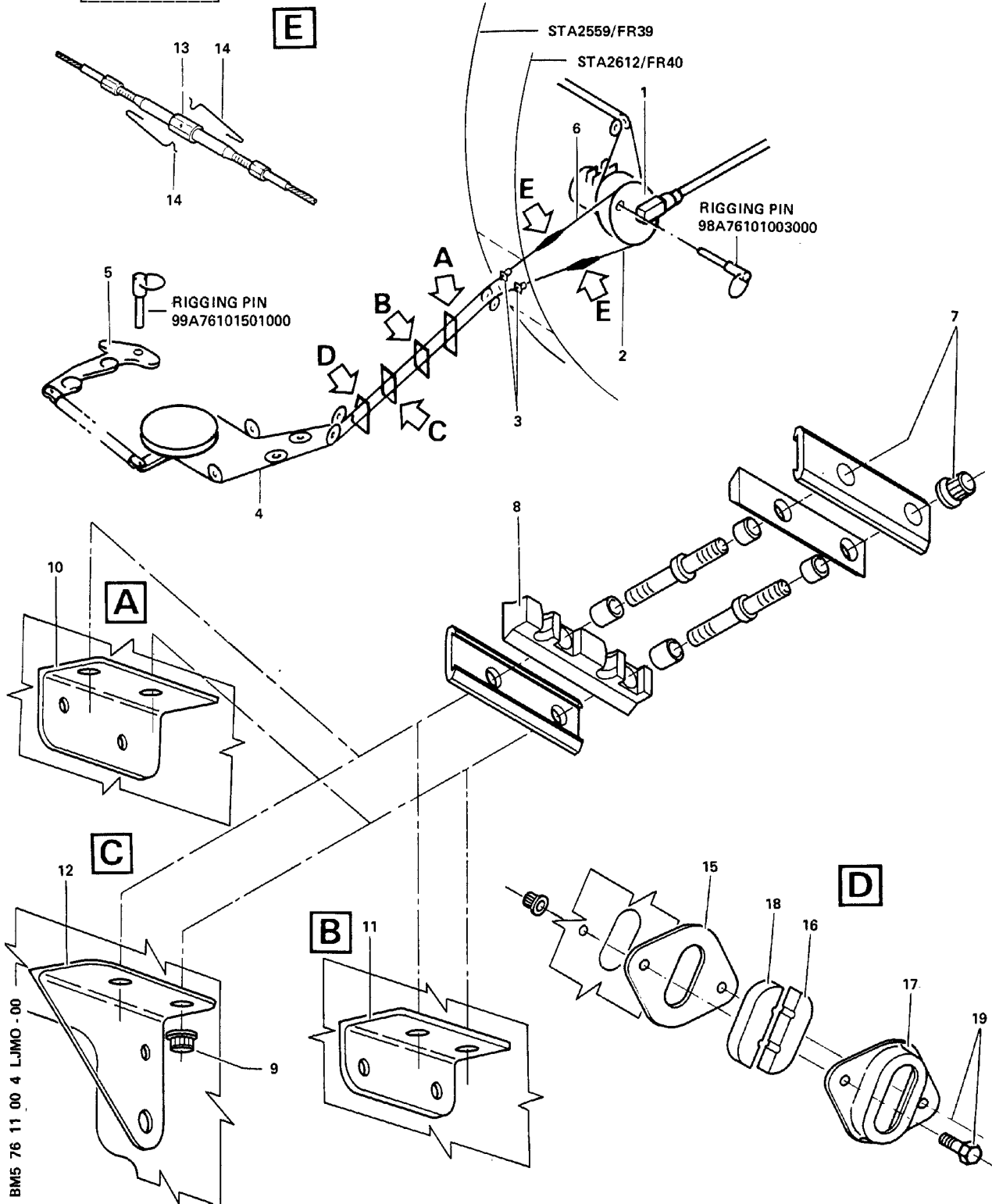
- (1) Install ends of cables (2) and (6) into their recesses in ATS coupling unit (1).
- R (2) Install fairleads on ATS coupling unit (1) (Ref. 22-33-28, P. Block 401).
- (3) In secondary transmission pulley (46), install cable (4) end in its recess. Install fairlead (47) and cover (43) (Ref. 76-11-31, P. Block 401).
- (4) Engage both ends of cable (4) in bracket (45) and in grooves of the two pulleys (44). Install two fairleads (48).
- (5) Engage end of cable (4) in groove of pulley (41). Install fairleads (42) with spacers. Tighten and safety nuts of fairleads (42) with new cotter pins.
- (6) Engage end of cable (4) in groove of pulley (40). Install fairlead (39) with spacer. Tighten and safety nut of fairlead (39) with new cotter pin.
- (7) Engage the two ends of cable (4) in grooves of the two corresponding pulleys (37) and (38). Install fairlead (36). Install and tighten bolts (35).
- (8) Engage the two ends of cable (4) in corresponding recesses in flanges (15) and (17). Install fairlead halves (18) and (16) on cables, then insert in flange (17). Assemble flange (17) and flange (15) then install and tighten bolts (19).
- (9) Install fairleads assembly (8), (10), (11) and (12) with nuts (7) and (9). Tighten nuts and make certain that cables slide freely through fairlead.
- (10) Engage the two ends of cable (4) in grooves of corresponding pulleys (32) and (33). Install fairleads (31) with spacers and fairlead (34). Tighten bolts of fairleads (31) and (34).
- (11) Engage the two ends of cable through holes in pressure seals. Install pressure seals (Ref. 76-11-24, P. Block 401).
- (12) Engage end of cable (6) and cable (4) in turnbuckle barrel (13). Slight-

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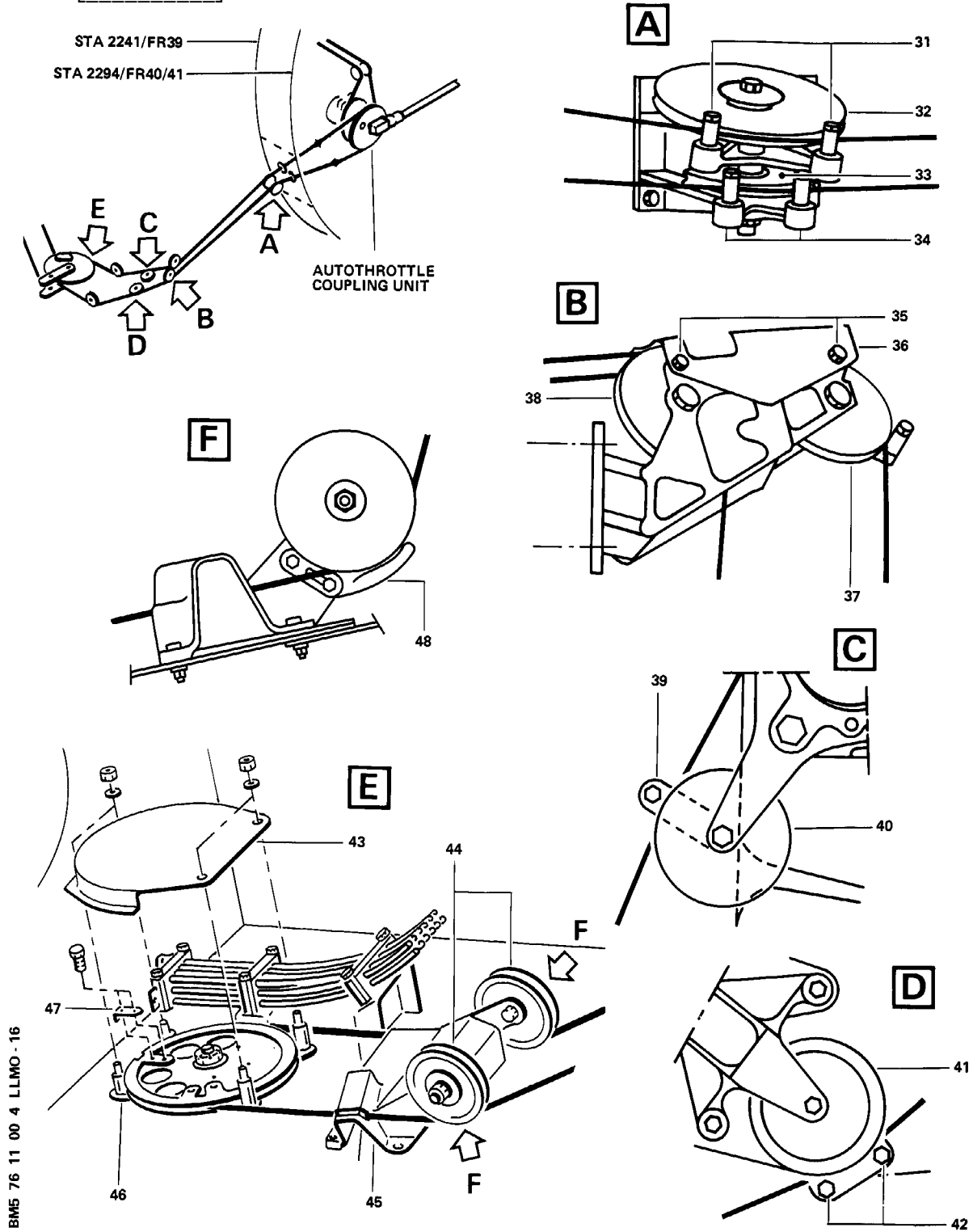
Cable Clamp Blocks in Wing  
Figure 404

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Throttle Control Cable in Wing  
Figure 405

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tly tighten barrel of turnbuckle (13).  
(13) Repeat the same method for cables (2) and (4).

**E. Adjustment/Test**

Refer to 76-11-00, P. Block 501.

**F. Close-Up**

- R (1) Remove blanking caps and install wing anti-icing ducts located between  
R RIB8 and RIB10 (Ref. 36-11-00, P. Block 401).  
(2) Remove rigging pins.  
(3) Remove blanking caps and install air bleed duct in engine pylon (Ref.  
36-11-00, P. Block 401).  
(4) Install the following skin panels and close access doors :  
(a) On engine pylon : 471AL, 472AR, 415AL, 416AR (481AL, 482AR, 425AL,  
426AR).  
(b) On wing  
- upper surface : 471AT (481AT), 512AT (612AT) and if applicable 513AT  
(613AT)  
- lower surface : 512AB, 512BB, 512CB, 512DB, 512EB, 512FB, 512GB,  
512HB, 512JB and 512KB (612AB, 612BB, 612CB,  
612DB, 612EB, 612FB, 612GB, 612HB, 612JB and 612KB).  
(5) Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).  
(6) Make certain that electronic racks ventilation is correct.  
(7) Remove flap and slat control lever locking tool 98A27503003000 and  
operate lever to retract slats.  
(8) Pressurize Green hydraulic system (Ref. 29-21-00, P. Block 301) by  
means of electric pumps.  
(9) Cut-off electric pump supply. De-energize the aircraft electrical net-  
work (Ref. 24-41-00, P. Block 301).  
(10) Make certain that working area is clean and clear of tools and miscel-  
laneous items of equipment.  
(11) In FWD cargo compartment at STA2294 (FR40/41) install ceiling panel 131SW  
(132SW).  
(12) Remove warning notices.  
(13) Remove safety clips and tags and close circuit breakers 306CJ1, 308CJ1,  
305CJ1, 308CJ2, 306CJ2, 1JH, 2JH, 1KG, 1KM and 2KM.  
(14) Remove access platforms.

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**THROTTLE CONTROLS - ADJUSTMENT/TEST**

**1. Equipment and Materials**

| ITEM                     | DESIGNATION                                                   |
|--------------------------|---------------------------------------------------------------|
| A.                       | Access Platform 2.70 m (9 ft.)                                |
| B.                       | Access Platform 4.10 m (13 ft. 8 in.)                         |
| C.                       | Ambient Temperature Thermometer                               |
| D.                       | Tensiometer                                                   |
| E.                       | Circuit Breaker Safety Clips                                  |
| F.                       | Cotter Pins                                                   |
| G.                       | Lock washer                                                   |
| H.                       | Turnbuckle Safety Clips                                       |
| I.                       | Corrosion - Resistant Steel Lockwire Dia. 0.032 in (0.813 mm) |
| J.                       | Dynamometer                                                   |
| K. 99A76101003000        | Pin - Rigging - Throttle Control Microswitch Unit             |
| L. 98A27901005000        | Pin - Rigging, Cable Tension Regulator                        |
| M. 98A76101003000        | Pin - Rigging, Autothrottle Coupling Unit                     |
| N. 99A76101501000        | Pin - Rigging, Primary Transmission Crank lever               |
| O. 99A76101500000        | Pin - Rigging, Primary Transmission Crank lever Interlock     |
| R P. RSE1041-1           | Pin - Rigging                                                 |
| Q. 97A76102500002        | Quadrant - Graduated, Throttle and Thrust Reverser Controls   |
| R. 98A76103004000        | Adapter - Spring Scale                                        |
| 97A76102003000           | Adapter - Spring Scale                                        |
| 97A27902016000           | Spring Scale Assy                                             |
| S. 99A76101506000        | Quadrant - Graduated, MEC                                     |
| T. 2C6983                | Opening/Closing Tool - Thrust Reverser                        |
| U. 35M5M01140001         | Test Set - Thrust Reverser Microswitch                        |
| V. 16987886-003          | Rigging Pin - Transducer Unit                                 |
| Referenced Procedures    |                                                               |
| - 71-00-00, P. Block 501 | Power Plant - General                                         |
| - 71-13-00, P. Block 301 | Cowl Doors                                                    |
| - 22-33-16, P. Block 401 | Throttle Position Detectors                                   |
| - 76-11-22, P. Block 401 | Throttle Control Microswitch Unit                             |
| - 78-31-00, P. Block 901 | Thrust Reverser System Control                                |

**2. Procedure**

**CAUTION** : WHEN INSTALLING RIGGING PINS, CABLE TURNBUCKLESS MUST BE DIFFERENTIALLY ADJUSTED TO PERMIT FREE INSTALLATION OF PINS DURING TEST PROCEDURES. IF ANY FORCE IS REQUIRED TO REMOVE OR INSTALL RIGGING RIGGING PINS, CABLES, TURNBUCKLES ROD ENDS OR CLEVIS ENDS MUST BE ADJUSTED COMPLYING WITH THIS PROCEDURE TO ELIMINATE BINDINGS.

**NOTE** : The adjustment procedure is the same for RH and LH throttle controls. It consists in three parts :

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- Adjustment procedure between throttle control and primary relay (in pylon) which is performed at Forward Idle Throttle position.
- Adjustment procedure between primary relay and MEC (on engine) which is performed at MEC power lever angle 80 degrees (thrust lever angle 14 degrees).
- Adjustment procedure of the reverse interlock.  
It is recommended to perform each step of this procedure in parallel on the two sides.

**NOTE :** The procedure may be carried out with aircraft on jacks or on wheels

- Unless specified in the test, all the operations must be performed without energizing the aircraft.
- Microswitch units 112VU and 113VU and TLA resolvers are considered adjusted
- The adjustment described in this procedure applies to LH cable run, i.e. engine 1.
- Check for absence of gap in control linkage items (bellcranks, bearings, rods, etc...).

### A. Job Set-Up

(1)Open, safety and tag the following circuit breakers

| PANEL | SERVICE                           | IDENT. | LOCATION |
|-------|-----------------------------------|--------|----------|
| 21VU  | AFS/TCC/SYS1/28VDC                | 306CJ1 | 102/H 8  |
| 21VU  | AFS/TCC/SYS1/115VAC               | 308CJ1 | 102/H 9  |
| 21VU  | AFS/TCC/SENSOR                    | 305CJ1 | 102/H10  |
| 21VU  | AFS/TCC/SYS2/115VAC               | 308CJ2 | 102/H11  |
| 21VU  | AFS/TCC/SYS2/28VDC                | 306CJ2 | 102/H12  |
| 133VU | ENGINES/ENG2/REVERSER/CTL         | 2KM    | 331/V74  |
| 133VU | ENGINES/ENG1/REVERSER/CTL         | 1KM    | 332/U69  |
| 133VU | ENGINES/ENG1 & 2/IGNITION/SYS B   | 2JH    | 333/T72  |
| 133VU | ENGINES/ENG1 & 2/IGNITION/SYS A   | 1JH    | 334/S72  |
| 133VU | ENGINES/ENG1 & 2/START/CTL & WARN | 1KG    | 335/R68  |

**CAUTION :** DISPLAY WARNING NOTICE PROHIBITING OPERATION OF THROTTLE CONTROL LEVERS AND FLAP/SLAT CONTROL LEVERS ON PANELS 9VU AND 429VU.

- R (2)In avionics compartment, open access door 121BL.
- R (3)In forward cargo compartment at STA2210, remove panels 131SW, 131RW, 132SW and ceiling panels 131GC, 132GC giving access to turn-buckles.
- (4)Position access platforms at FWD cargo compartment and upper part of engine pylon.
- (5)Remove access doors 415AL (425AL), 416AR (426AR), 471AL (481AL), 413DL (423DL), 472AR (482AR).
- (6)Open, safety and tag circuit breakers for the appropriate engine and open fan and thrust reverser cowls (Ref. 71-13-00, P. Block 301).

**NOTE :** This adjustment procedure comprises three parts :

- Adjustment procedure of throttle control in fuselage and wing
- Adjustment procedure between primary transmission and MEC in engine
- Adjustment procedure of the reverse interlock.

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(7) Fully untighten friction brake prior to adjustment.

### B. Check

**CAUTION** : IF THE FOLLOWING PROCEDURE IS PERFORMED AFTER REMOVAL/INSTALLATION OF THE THROTTLE CONTROL CABLES IN FUSELAGE OR WINGS, MAKE CERTAIN THAT CABLES ARE CORRECTLY INSTALLED. CHECK THAT THERE IS NO DUAL REVERSAL.

- (1) linkage components for correct conditions and security of attachments,
- (2) possible interferences,
- (3) pulleys, cables, pushpull cables for traces of wear, corrosion, or rubbing.

### C. Adjustment Between Throttle Control Levers and Primary Relay in Pylon.

- (1) Adjustment of throttle detectors (Ref. Fig. 501)
    - (a) Place throttle control lever in Forward Idle position
    - (b) Rig microswitch unit with rigging pin 99A76101003000.
    - (c) Make certain that in this position drift pin 16987886-003 can be easily inserted in and removed from throttle detectors.
    - (d) If not (Ref. 22-33-16, P. Block 401).
    - (e) Remove drift pin in throttle detectors.
  - (2) Adjustment between microswitch unit and cable tension regulator (Ref. Fig. 501)
    - (a) with microswitch unit pin rigged, make certain that in this position, rigging pin 98A27901005000 can be easily inserted and removed in cable tension regulator. If not, adjust length of rod (2) (Ref. Fig. 501)
    - (b) remove rigging pin on microswitch unit.
  - (3) Adjustment between cable tension regulator and autothrottle coupling unit (Ref. Fig. 501, 502)
    - (a) With cable tension regulator pin rigged.
    - (b) Rig autothrottle coupling unit with rigging pin 98A76101003000.
    - (c) If rigging pin can not be installed on autothrottle coupling unit, slacken or tension one cable evenly using turnbuckles located between frames 38/1 and 40/41 in fuselage, so as to allow autothrottle coupling unit rigging pin 98A76101003000 to be slip fit installed.
    - (d) Note hall ambient temperature
    - (e) Adjust cable tension until cable tension regulator index faces the scale graduation corresponding to ambient temperature.  
the correspondance between ambient temperature and graduation is indicated in referenced graph. (Ref. Fig. 502).
- NOTE** : During and after cable tensioning, flex the same length of cable on both runs and release immediately. During cable deflection, make certain that cable tension regulator locking crossbeam slides freely.
- NOTE** : Make certain that the two cable tension regulators are rigged at the same value.
- (f) Make certain that rigging pins from cable tension regulator and autothrottle coupling unit slide freely in corresponding pin holes and remove pins.
  - (g) Proceed manually with several cycles of throttle control lever (to stabilize the control), then return to FIT.
  - (h) Rig cable tension regulator again and make certain that autothrottle

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coupling unit can be easily rerigged. If necessary readjust cable tension until easy rigging is obtained.

- (i) Safety cable tension regulators
  - (j) Remove rigging pin from cable tension regulator.
  - (4) Adjustment between autothrottle coupling unit and primary transmission relay.
    - (a) With autothrottle coupling unit rigged with pin 98A76101003000.
    - (b) Check that secondary transmission pulley adjustment lever is preadjusted as its nominal dimension as follows : (Ref. Fig. 503)
      - 1 Manufacture tool made from sheet of iron as indicated (Ref. Fig. 504)
      - 2 Position tool on adjustable lever (Ref. Fig. 504)
    - (c) If nominal position is not reached, readjust (Ref. Fig. 503)
      - 1 Remove lockwire from nuts.
      - 2 Untighten adjustment screw (1)
      - 3 Rotate adjustment screw (1) (counterclockwise to increase length and clockwise to decrease) until dimension  $78 \pm 3$  mm ( $3.04 \pm 0.11$  in.) is reached.
      - 4 Wirelock nuts.
- NOTE** : To perform this adjustment, it is possible to use only one hand. The adjustable lever is visible through the hole located near the secondary transmission adjustable lever access door (416AR/415AL) (Ref. Fig. 504).
- CAUTION** : ENGAGEMENT OF THE YOKE INTO SECONDARY TRANSMISSION LEVER MUST NOT BE LESS THAN 0.5 MM (0.019 IN.).
- (d) Rig primary transmission crank lever (access through panel 414GR (424 GR)) in FIT (52° PLA) position with rigging pin 99A76101501000 (Ref. Fig. 505)
 

**NOTE** : Make certain that rigging pin is correctly inserted in hole corresponding to FIT position.
- R (e) Note ambient temperature.
- R Using turnbuckles located in front of FR39 between autothrottle coupling unit and wing to fuselage function adjust cable tension until the value corresponding to ambient temperature is reached (use tensiometer to read the cable tension value). The correspondence between tension and temperature is indicated in the referenced graph (Ref. Fig. 506).
- R (f) Make certain that rigging pins from autothrottle coupling unit and from primary transmission crank lever slide freely in pin holes and remove pins.
- (g) Proceed manually with several cycles of throttle control lever (to stabilize the control) then return to FIT.
- (h) Rig autothrottle coupling unit again and make certain that primary transmission can be easily rigged in FIT position (52°).
- (i) If necessary adjust again cable tension until easy rigging is obtained.

### D. Adjustment Procedure Between Primary Transmission and MEC in Engine (Ref. Fig. 507, 508)

- (1) Rig primary transmission crank lever (access through panel 414ER (424ER) in the position corresponding to 80° PLA (Power Lever Angle) on engine with rigging pin 99A76101501000.

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**NOTE** : The position corresponding to 80° PLA (Power Lever Angle) corresponds to 14° TLA (Thrust Lever Angle).

- R (2) Insert rig pin RSE1041-1 through flange of fuel control body and engage slot on power lever at 80 degree rig position (Ref. Fig. 508).  
(3) Untighten the two jammuts of the adjustment sleeve at the end of the flexible control and adjust position of end rack to enable cable engagement and installation of the dual clamp (Ref. Fig. 507)

**NOTE** : Engagement difference between the thread of both adjustment sleeves must not exceed 1.5 mm.

- (4) Tighten the two adjustment sleeve jammuts.  
R (5) Remove rigging pins RSE1041-1 and 99A76101501000.  
(6) Place power lever in the full forward power position.  
(7) In this position, i.e. power lever on MEC 130° mechanical stop, check that a minimum clearance of 2 mm (0.08 in.) is available between translating cable part and sheath flared end at pylon rib 8 (Ref. Fig. 507) If necessary, modify flexible cable travel at level of sheath ends on pylon and engine sides.  
(8) Place power lever in the normal idle power position.  
(9) If the flexible control has been readjusted in the above step, check the MEC 80° rigging.

### E. Adjustment of the Reverse Interlock

**NOTE** : The reverse interlock controls are installed and adjusted per nominal values (Ref. Fig. 507)

- (1) Deploy reverser manually (Ref. 78-31-00, P. Block 901).  
(2) Make certain that with thrust reverser control lever in flight compartment, RFT stop on MEC can be reached in the same conditions as in paragraph F. (3).  
(3) Stow reverser manually (Ref. 78-31-00, P. Block 901).  
(4) Make certain that with thrust control lever in flight compartment, FFT stop on MEC can be reached in the same conditions as in paragraph F.(2).  
(5) Wirelock sheath end, safety control end fitting on interlock mechanism.

### F. Travels and Stop Check :

- (1) On center pedestal install throttle and thrust reverser controls graduated quadrant 97A76102500002.  
(a) Place throttle control lever in FIT position  
(b) Adjust thrust reverser and throttle control levers displacement indexes.  
(2) Check elasticity on Full Forward position  
(a) Place throttle control lever in FIT position.  
(b) Move slowly throttle control lever from FIT to FFT  
(c) Introduce between MEC power lever and its stops (corresponding to 130° PLA) a paper strip. Move throttle lever until pinching of paper strip.  
(d) Note angle value on center pedestal graduated quadrant : A1  
(e) Go on to move throttle lever to FFT. Note angle value on center pedestal graduated quadrant : A2  
(f) Check that difference between A2 and A1 is comprised between 1°20' and 3°.

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- (g)Return to FIT
- (3)Check elasticity on Full Reverser position :
  - (a)Deploy thrust reverser manually or pneumatically (Ref. 78-31-00, P. Block 901).
  - (b)Move slowly reverser throttle control lever from FIT to RFT.
  - (c)Introduce between MEC power lever and its stop (corresponding to 6° PLA) a paper strip. Move reverser throttle control lever until pinching of paper strip.
  - (d)Note angle value on center pedestal graduated quadrant : A3
  - (e)Go on to move reverser throttle control lever to RFT. Note angle value on center pedestal graduated : A4
  - (f)Check that difference between A4 and A3 is comprised between 1° and 6°.
  - (g)Stow thrust reverser (Ref. 78-31-00, P. Block 901)

**NOTE** : In the case of FFT and RFT positions being reached in the flight compartment before stops on engine, or of too small elasticity, adjust secondary transmission pulley adjustment lever 2. C. (4) (b).

**G. Check for Correct Control Levers Operation :**

- (1)Make certain throttle and thrust reverser controls graduated quadrant is installed.
- (2)On engine install MEC graduated quadrant item 99A76101506000.
- (3)Under the Flight compartment, at microswitch units 112VU and 113VU, install tool for checking of microswitches 7KM and 8KM. Test set 35M5M01140001.
- (4)Adjust travel checking tools as follows :
  - (a)Place throttle control lever in FIT position,
  - (b)Rig primary transmission with pin rigging 99A76101501000 in FIT position,
  - (c)Adjust throttle control lever displacement index,
  - (d)Adjust thrust reverser control lever displacement index.
  - (e)On primary transmission relay remove rigging pin 99A76101501000 from FIT position and rig it at 80°.
  - (f)Adjust graduated quadrant item 99A76101506000 on MEC, i.e. power lever angle at 80°.
  - (g)Remove rigging pin from transmission relay.
- (5)Move throttle control lever from FIT to FFT and FFT to FIT.
- (6)Make certain that during the operation no friction point is found.
- (7)With throttle control lever in FIT position, check that thrust reverser control lever can be placed in RI position.
- (8)With thrust reverser control lever in RI position, check that control lever can move neither to FFT nor to RFT position.
- (9)Move reverser control lever to FIT position and check then that throttle control lever can move to FFT.
- (10)Move throttle control lever somewhere between FIT and FFT, and check that reverser control lever cannot be placed in RI position.

**H. Check of Thrust Reverser Control Lever :**

**NOTE** : Microswitches to be checked are 7KM and 13KM for LH engine and 8KM and 14KM for RH engine. For complete test of microswitch units (Ref. 76-11-22, P. Block 401).

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- (1) Install graduated quadrant 97A76102500002 on control levers.
- (2) Disconnect connectors 577VC from 113VU and 578VC from 112VU.  
Connect Test Set 35M5M01140001 to both microswitch units as identified on cable (Ref. Fig. 509).
- (3) Place ON/OFF switch in ON position.
- (4) Press LIGHT TEST pushbutton.
- (5) Check the 8 lights come on.
- (6) Place throttle control levers in FIT position.
- (7) Check that lights on Test Set indicate the open position for microswitches 7KM and 8KM and do not indicate the closed position for microswitches 13KM and 14KM.
- (8) Slowly move both thrust reverser control levers towards RI position.
- (9) Check that the four microswitches close before the thrust reverser control levers reach 41° on quadrant and RI position.
- (10) Move both thrust reverser control levers from RI to RFT and from RFT to RI.
- (11) Check that the four microswitches remain closed.
- (12) Slowly move both thrust reverser control levers from RI to FIT position.
- (13) Check that lights indicate the open position for microswitches 7KM and 8KM and do not indicate the closed position for microswitches 13KM and 14KM when both thrust reverser control levers are between 28°30' and 20°30' on quadrant.
- (14) Place ON/OFF switch in OFF position.
- (15) Remove tool 35M5M01140001 and connect 577VC and 578VC.
- (16) Remove tool 97A76102500002.
- (17) Check that levers are in FIT position.

**I. Throttle Controls Stagger Check**

- R
- (1) On MEC on engines 1 and 2, insert rigging pin RSE1041-1 through MEC body and into MEC power lever (corresponding to 80° PLA).
  - (2) Check misalignment between both throttle control levers does not exceed 2mm (0.08 inch).
  - (3) If not check tension regulator rigging index position between both sides and cable tension between autothrottle coupling unit and primary relay (Ref. Steps C. (3) and (4)).
  - (4) Remove rigging pin on MEC power lever.

**J. Check of Throttle Control Lever Efforts**

**NOTE** : Efforts should be applied very slowly in the same plane as and tangently to the throttle knob displacement.

**NOTE** : Before application of this procedure, make certain that there is fuel in the MEC. If not, wet motor the engine (Ref. 71-00-00, P. Block 501).

- (1) On throttle control lever, install adapter and spring scale 97A76102003000 and 97A27902016000.
- (2) Loosen the attach screw of the friction brakes.  
Measure the maximum load necessary to move the throttle control levers. Check that this value is below 6.3 lbf (2.8 daN).  
**NOTE** : Do not put any antiseize compound or lubricant Material on push-pull cables to get a correct effort.
- (3) Disconnect the throttle control levers at the tension regulator input

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lever.

Measure the load necessary to move the throttle control levers.  
Tighten the friction brake attach screw on the throttle control levers to achieve a load between 0.34 and 0.45 lbf (0.15 and 0.20 daN).

Wirelock the friction brake screw.

**NOTE** : Make certain that a sufficient number of friction brake screw threads are engaged and friction brake screw is not fully tightened not to fully compress the spring.

(4)Reconnect the throttle control levers at the tension regulator input lever.

Measure the maximum load necessary to move the throttle control levers.  
Check that the maximum load necessary to move the throttle control levers is below 6.76 lbf (3 daN).

(5)Remove adapter and spring scale from the throttle control levers.

**K. Check of Thrust Reverser Control Lever Efforts**

**NOTE** : Efforts should be applied in the same plane as and tangently to the throttle knob displacement.

(1)Deploy thrust reverser (Ref. 78-31-00, P. Block 901).

(2)On thrust reverser control lever, install adapter and spring scale 98A76103004000, and 97A27902016000.

(3)Note displacement efforts :

- from FIT to RI < 9lbf (< 4 daN).
- from RI to RFT < 11.7 lbf (< 5.2 daN).

(4)Remove adapter and spring scale from reverser control lever.

(5)Stow thrust reverser (Ref. 78-31-00, P. Block 901).

**3. Close-Up**

A. Check that all rigging pins have been removed.

B. Remove all tools.

C. Close access doors.

D. Close fan and thrust reverser doors (Ref. 71-13-00, P. Block 301).

E. Remove access platforms.

F. Remove warning notice.

G. Remove safety clips and tags and close circuit breakers 1KM, 2KM, 305CJ1, 306CJ1, 306CJ2, 308CJ1, 308CJ2, 1KG, 1JH and 2JH.

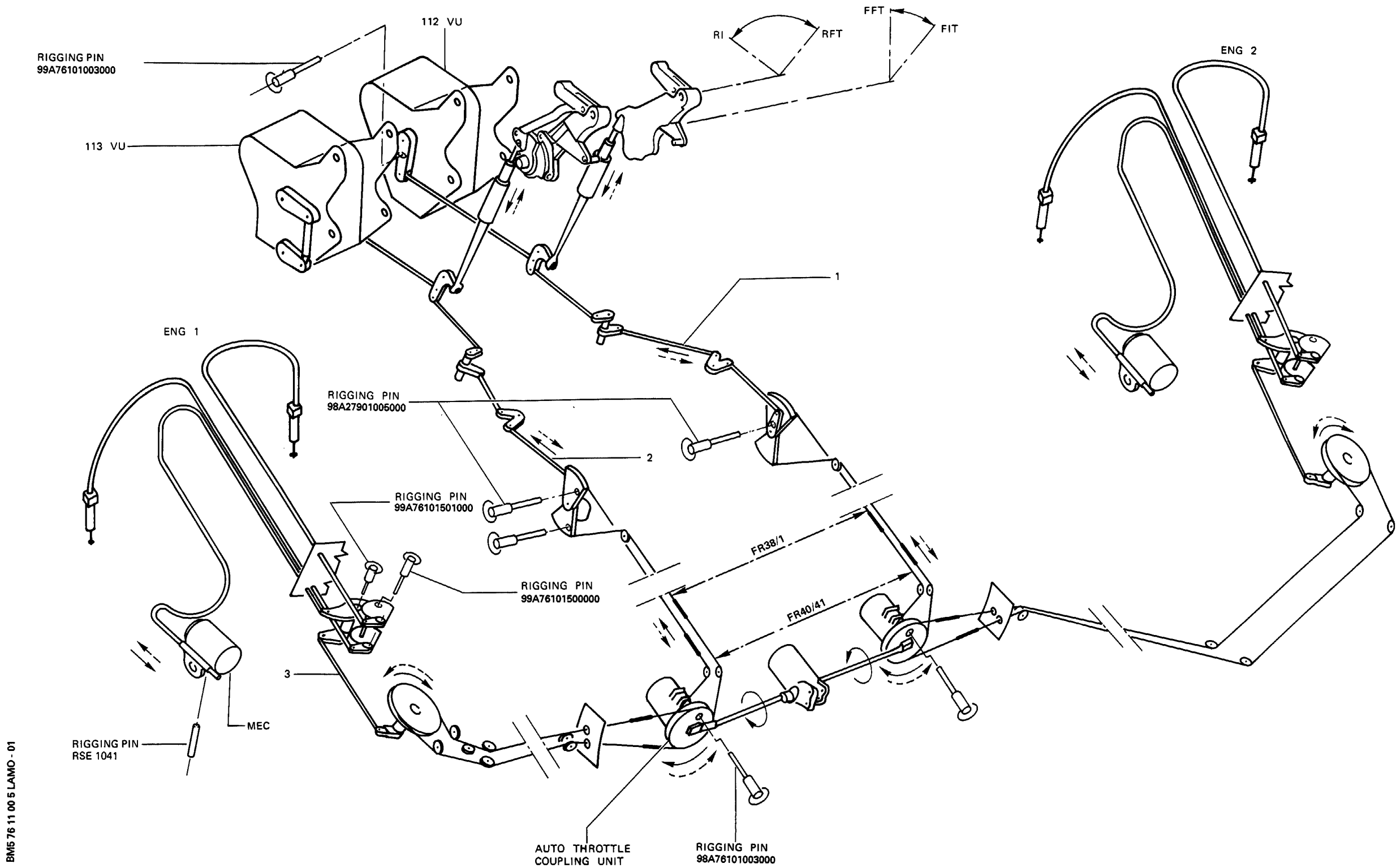
H. Make certain that throttle control levers are in idle position.

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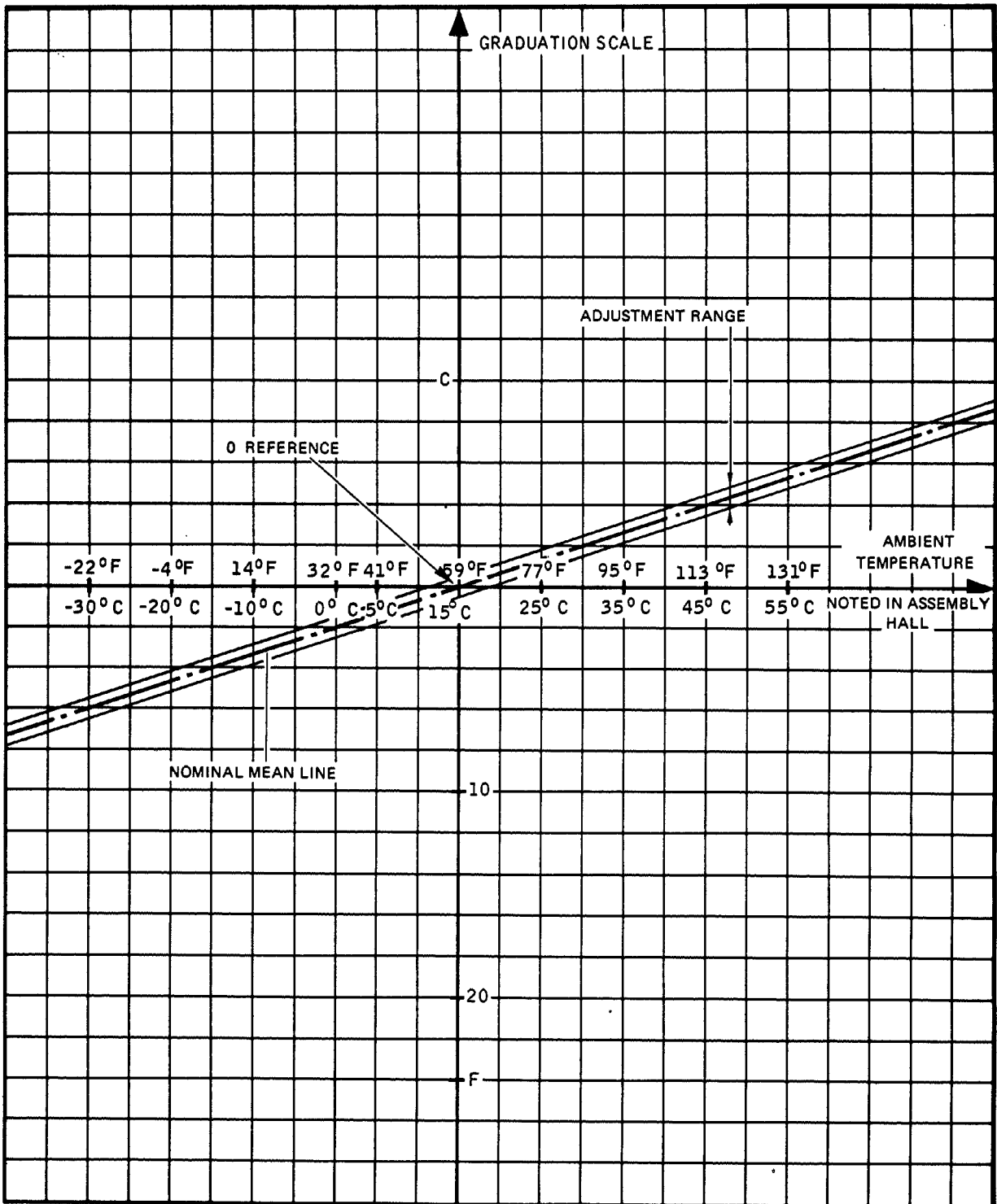
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Adjustment Points

Figure 501



BM5 76 11 00 5 LCMO - 17 - 13  
DM5

Fuselage Section - Cable Tension Adjustment Graph  
Figure 502

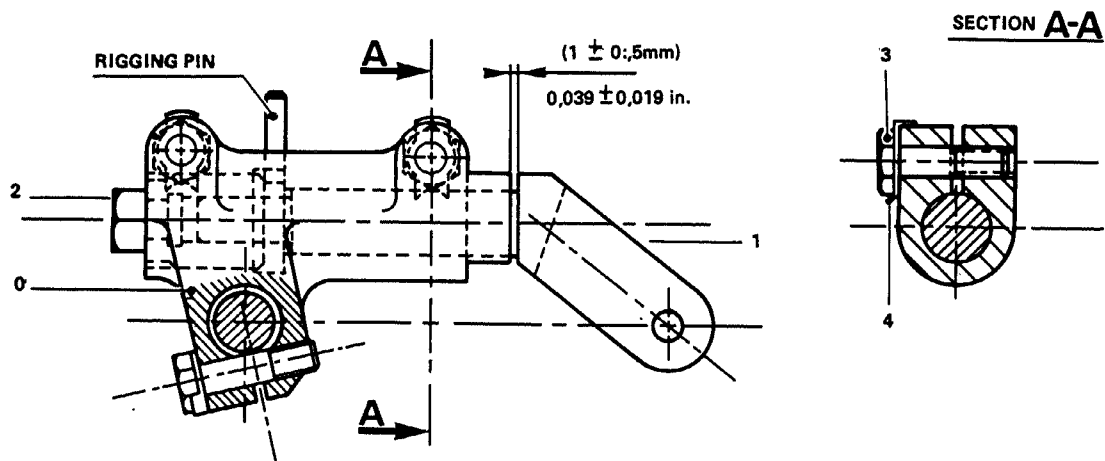
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**ASSEMBLY**



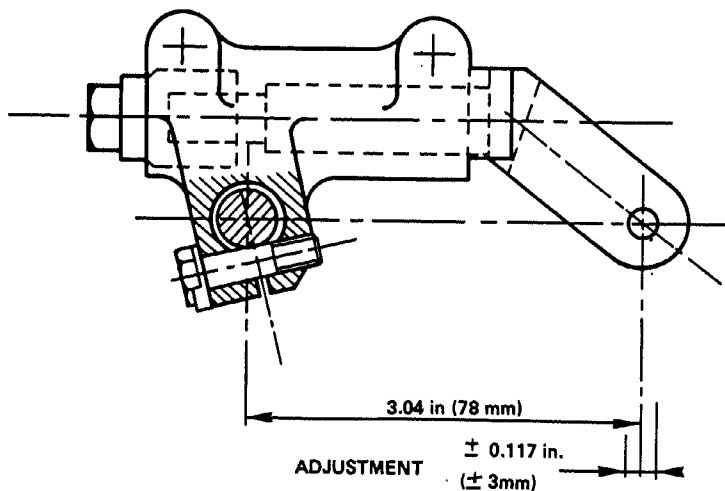
**INSTALLATION**

- 1) INSERT A RIGGING PIN DIA 0.156 in.(4mm) IN BODY OF LEVER ITEM 0.
- 2) TIGHTEN ADJUSTMENT SCREW ITEM 2 UNTIL IT IS IN CONTACT WITH RIGGING PIN(RH THREAD)
- 3) INSERT YOKE ITEM 1 IN LEVER BODY AND TIGHTEN IN ADJUSTMENT SCREW(LH THREAD) TO OBTAIN THE DIMENSION 0.039 in. ± 0.019 (1 mm ± 0.5)

**ADJUSTMENT TO NOMINAL POSITION**

- 1) STARTING FROM THE ABOVE POSITION UNTIGHTEN ADJUSTMENT SCREW UNTIL DIMENSION 3.04 in. (78mm) ± 0.117 in. (± 3mm) IS REACHED.
- 2) TEMPORARILY TIGHTEN BOLTS ITEM 3, TO IMMOBILIZE YOKE (DO NOT FOLD BACK TABS OF NUT LOCK WASHERS).

**NOMINAL POSITION**



Secondary Transmission Pulley Adjustable Lever  
Figure 503

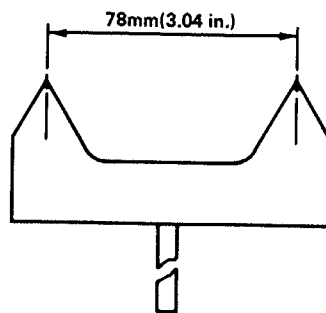
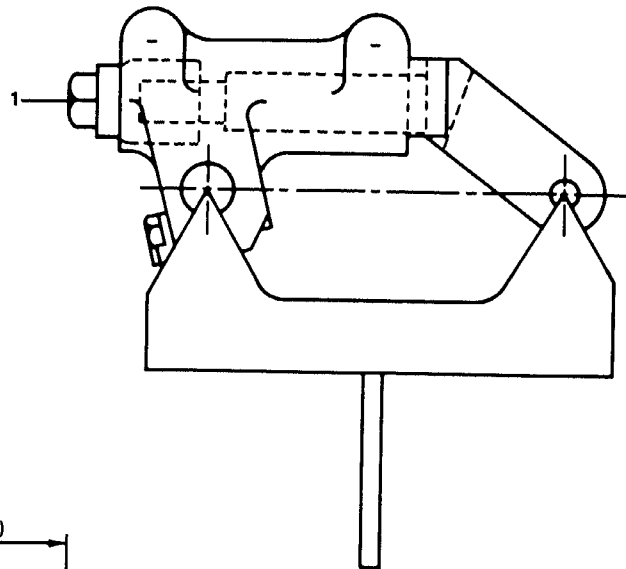
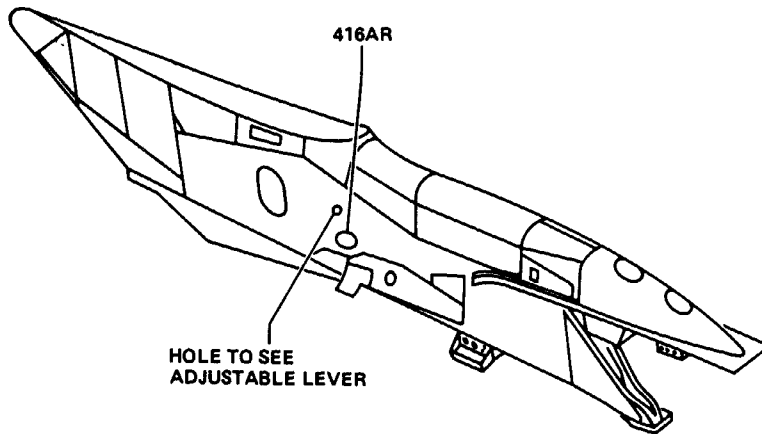
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Adjustable Lever Nominal Position Tool  
Figure 504

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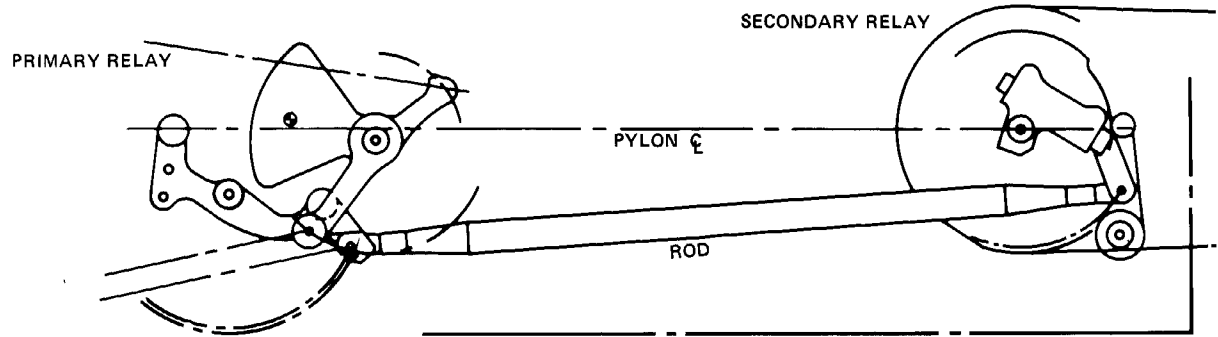
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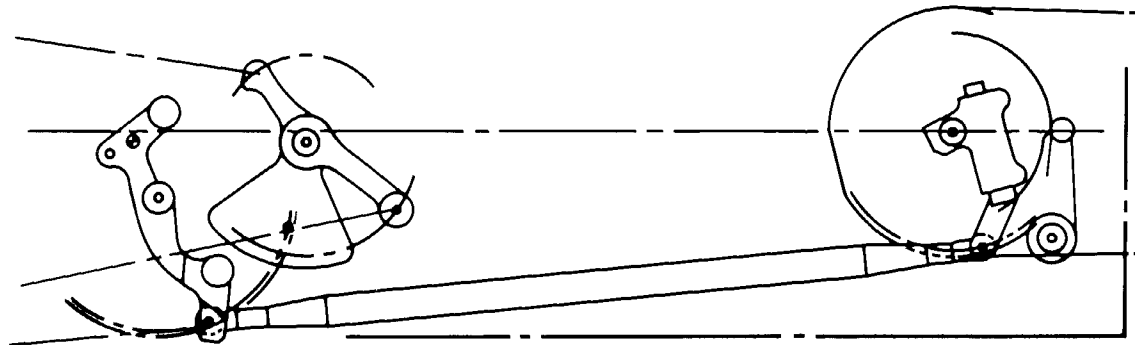
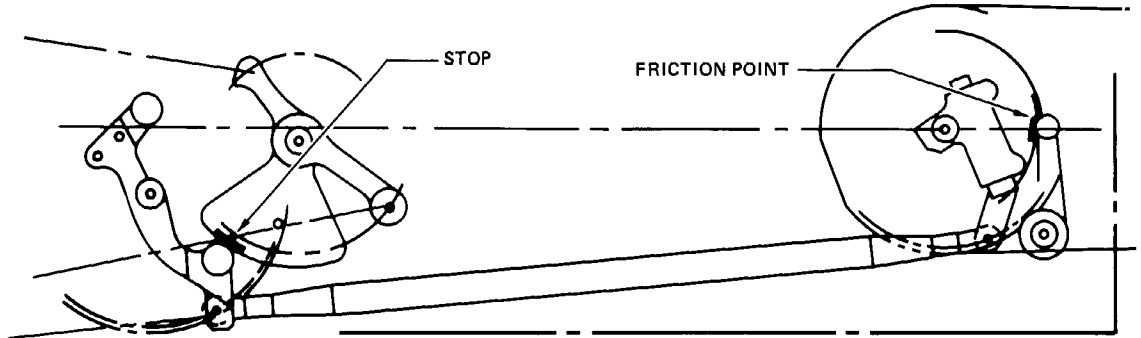
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INTERLOCK CONTROL RIG POSITION RFT  
POWER LEVER ANGLE : 0°



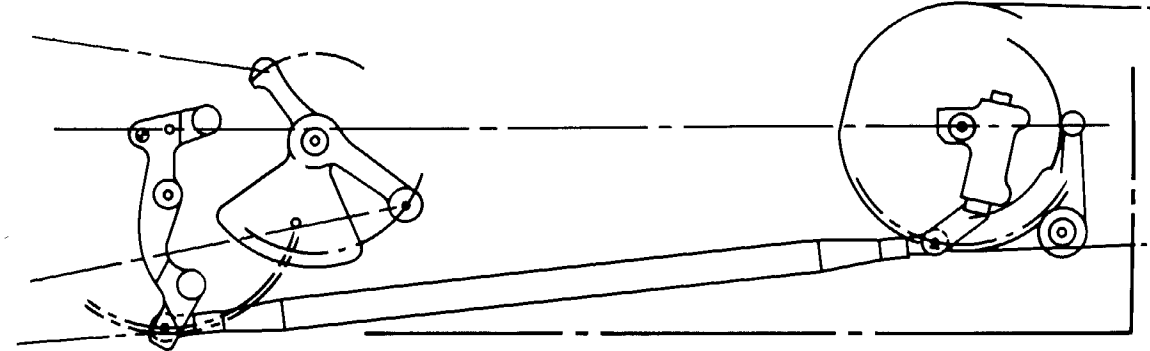
INTERLOCK STOP - REVERSE IDLE - P.L.A: 35°

FRICTION POINT - P.L.A : 42° 57' 14"

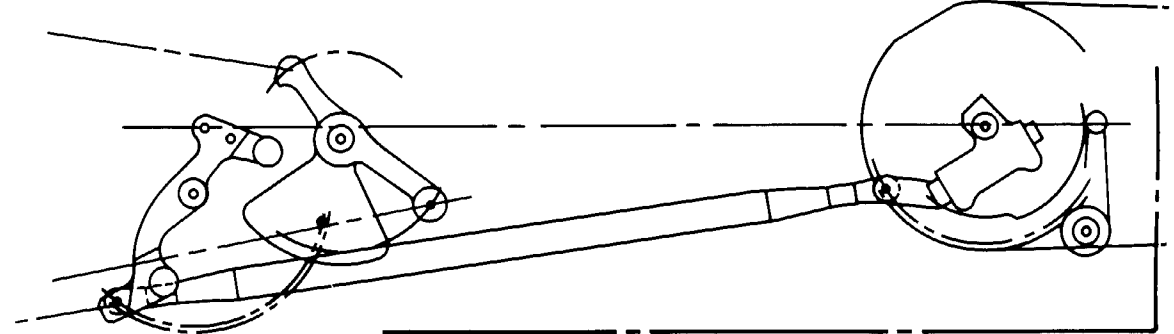


CONTROL RIG POSITION - IDLE TRIM - POWER LEVER ANGLE : 52°

CONTROL RIG POSITION - POWER LEVER ANGLE : 80°



FFT POWER LEVER ANGLE : 130°



LEGEND

- ⊙ STATIONARY HINGE PIN
- MOVABLE HINGE PIN
- CONTROL RIG POSITION
- RFT REVERSE FULL THROTTLE
- FFT FORWARD FULL THROTTLE
- PLA POWER LEVER ANGLE

| POSITION                    | POWER LEVER ANGLE | PRIMARY RELAY ANGLE | SECONDARY RELAY ANGLE | TLA POSITION (TOLERANCES) |
|-----------------------------|-------------------|---------------------|-----------------------|---------------------------|
| REVERSE FULL THROTTLE       | 0°                | 21°31'19"           | 5°02'31"              | 0° (0°-2°)                |
| STOP                        | 35°               | 54°38'10"           | 36°38'20"             | 0° (0°-2°)                |
| FRICTION POINT              | 42°57'14"         | 60°44'10"           | 42°58'31"             | 0° (0°-2°)                |
| IDLE TRIM                   | 52°               | 67°23'10"           | 50°                   | 0° (0°-2°)                |
| ENGINE CONTROL RIG POSITION | 80°               | 86°57'43"           | 71°28'30"             | 14° (13°50'-15°50')       |
| FWD FULL THROTTLE           | 130°              | 125°06'18"          | 123°08'38"            | 49° (46°-52°)             |

Sequence of Operations - Throttle Control  
Figure 505

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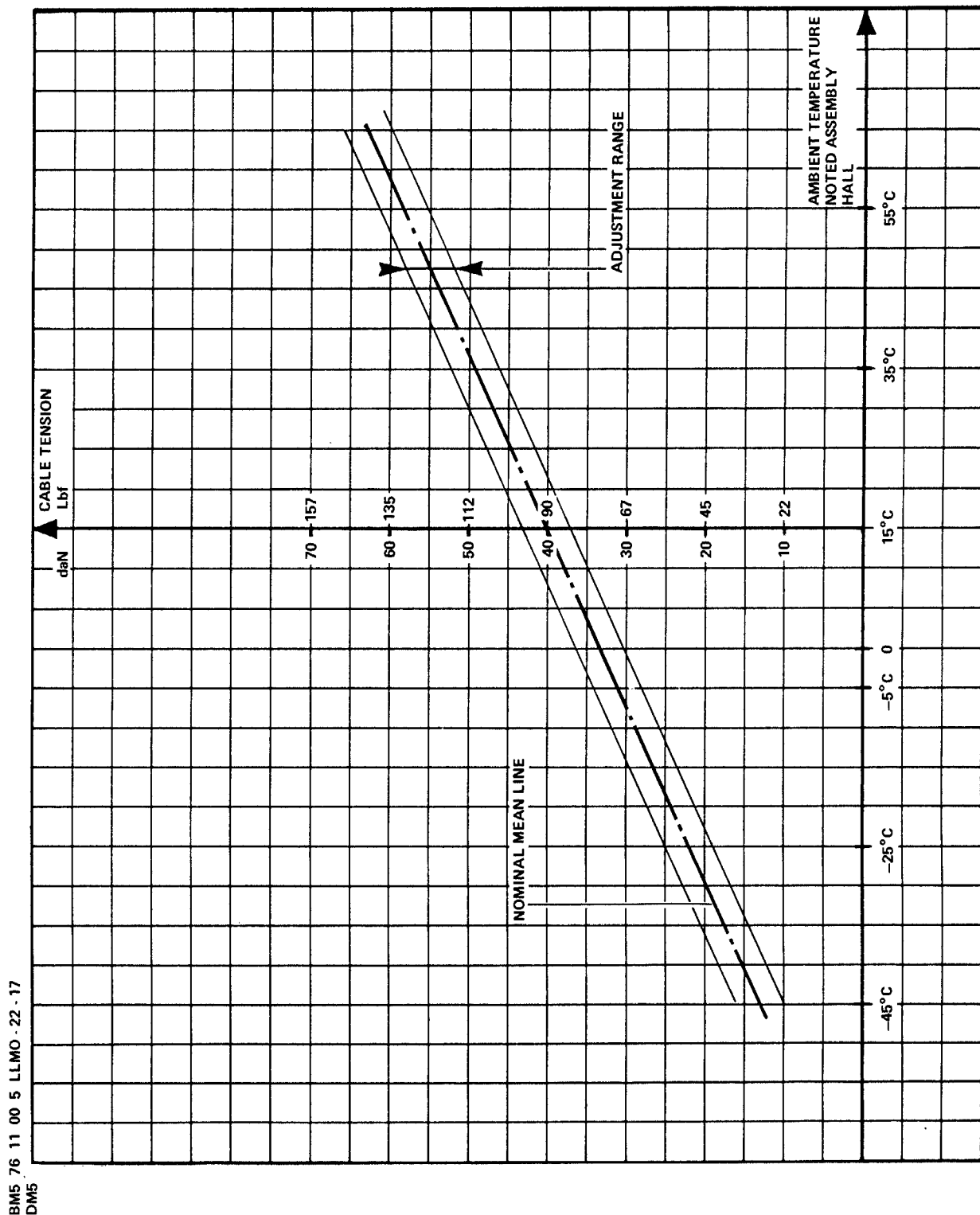
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Wing Section - Cable Tension Adjustment Graph  
Figure 506

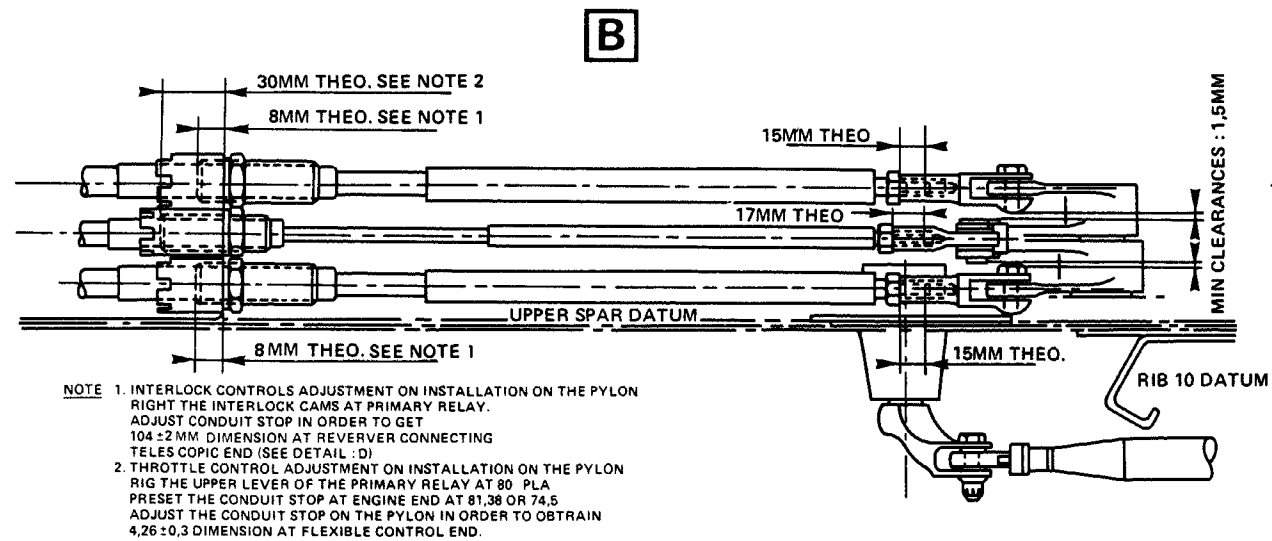
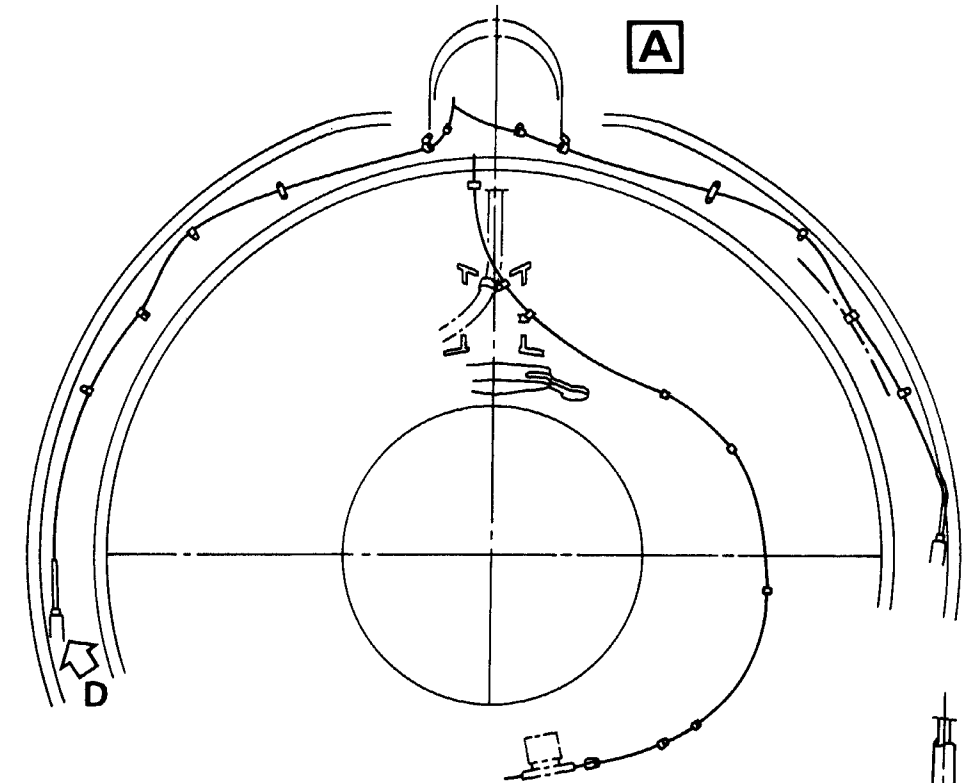
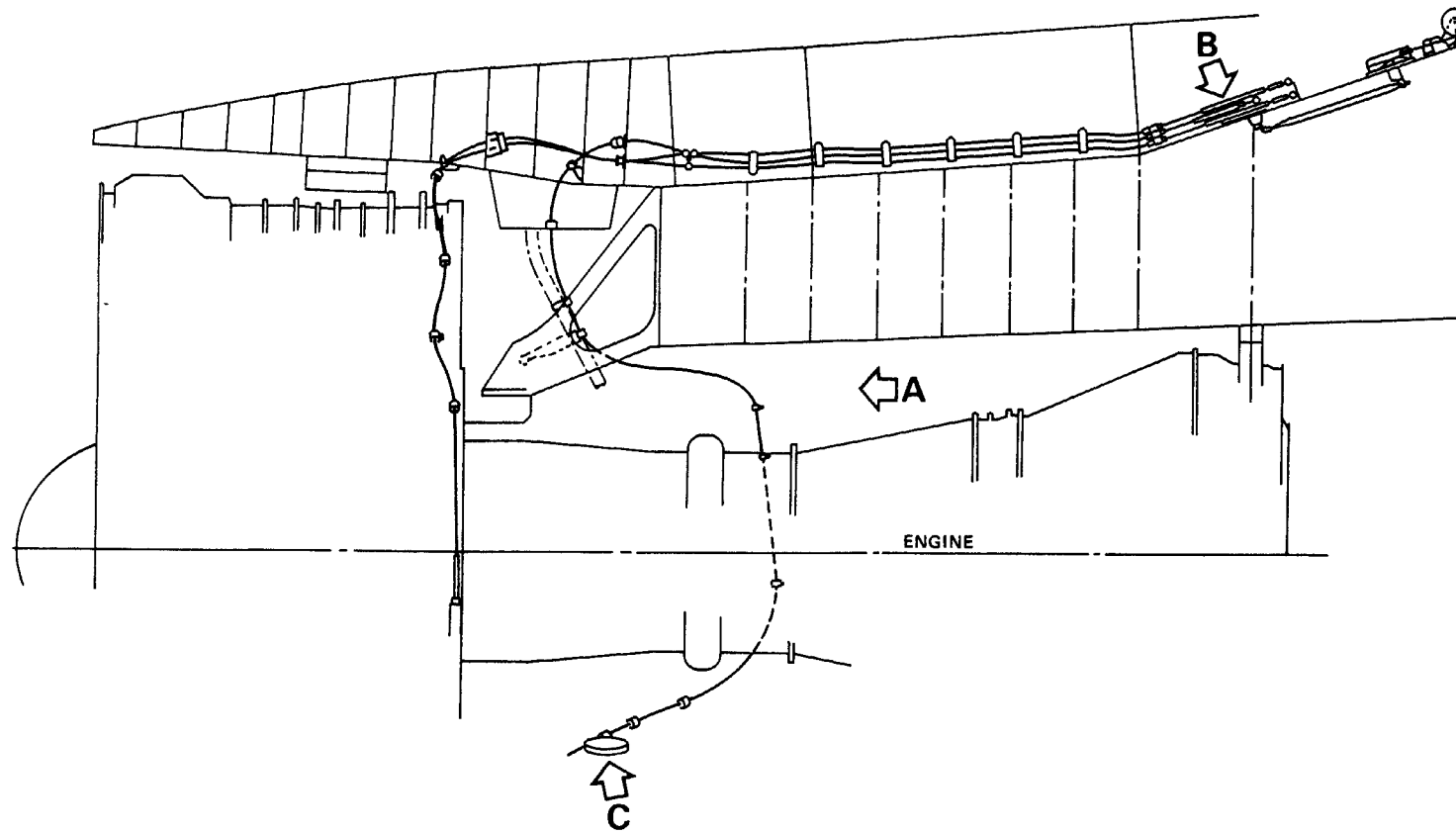
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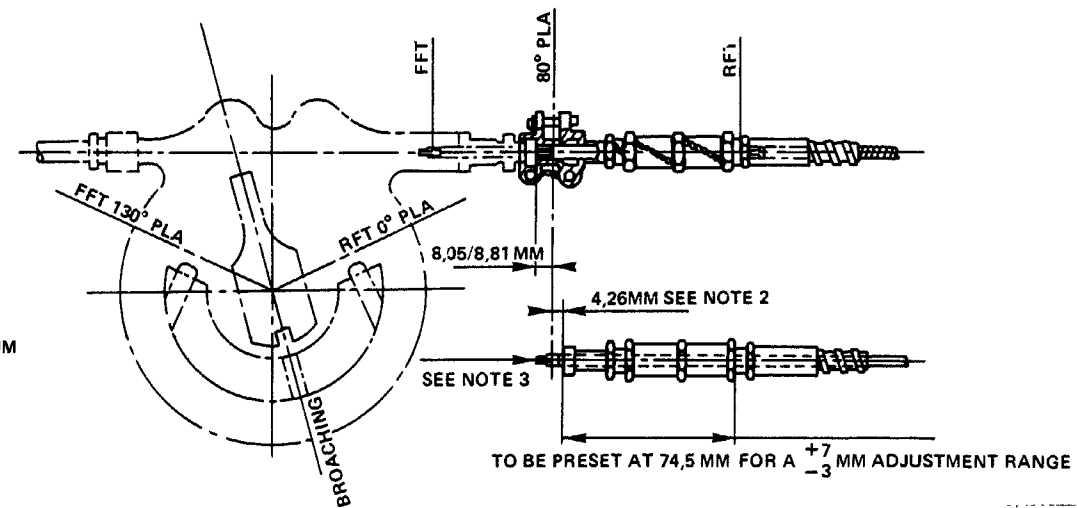
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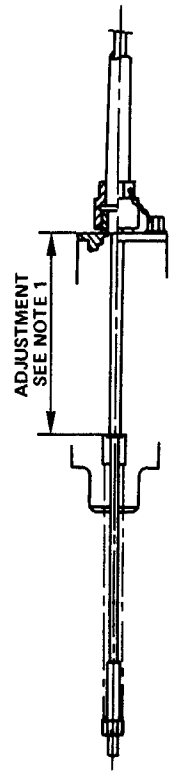


**C**

NOTE : 3. WHEN CONNECTING TO THE ENGINE DO NOT APPLY A TWIST EXCEEDING 15°  
IF REQUIRED RE-ADJUST END FITTING ASSY AT THE PRIMARY RELAY.



**D**



Theoretical Adjustment (Sheet 1/2)  
Figure 507

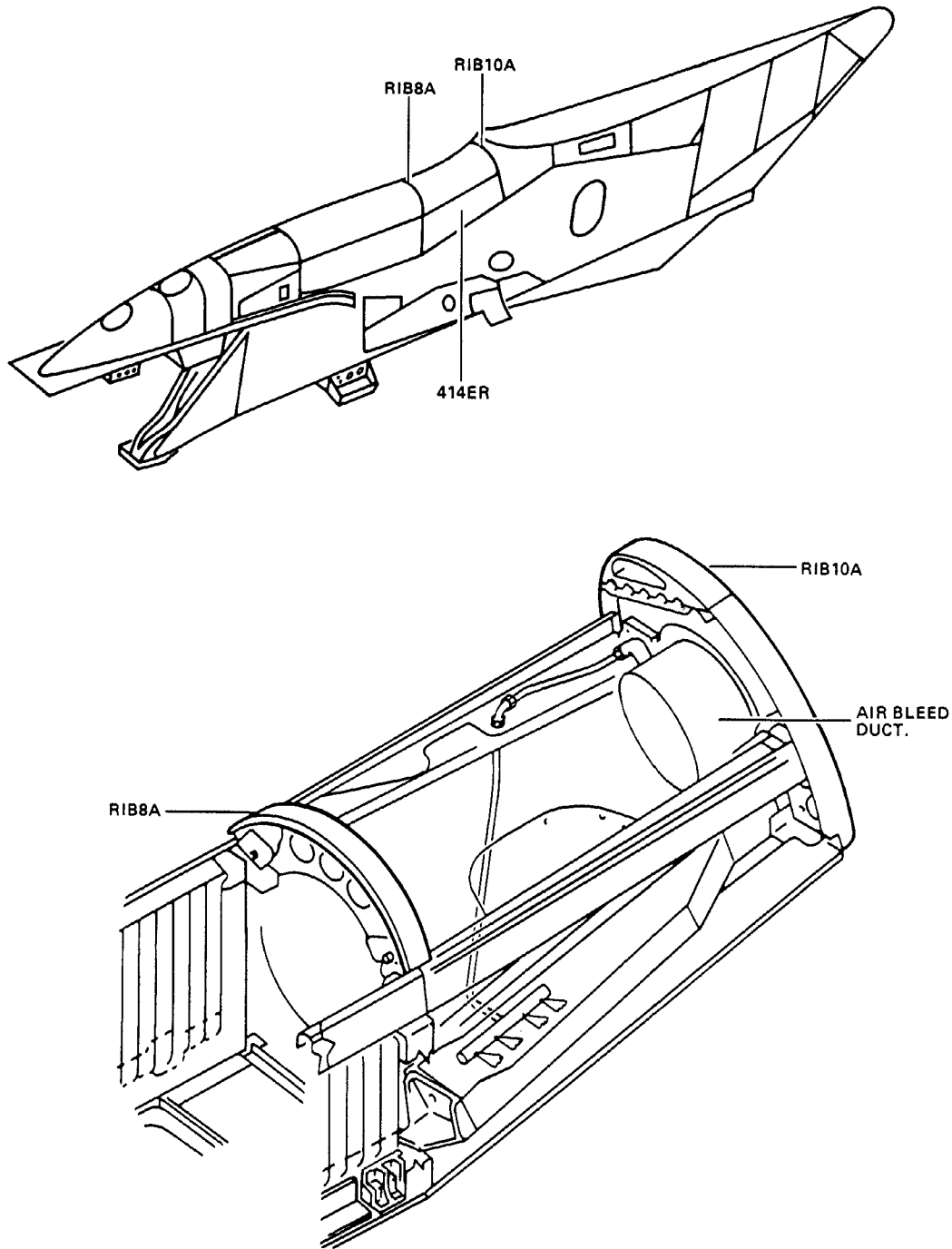
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Theoretical Adjustment (Sheet 2/2)  
Figure 507

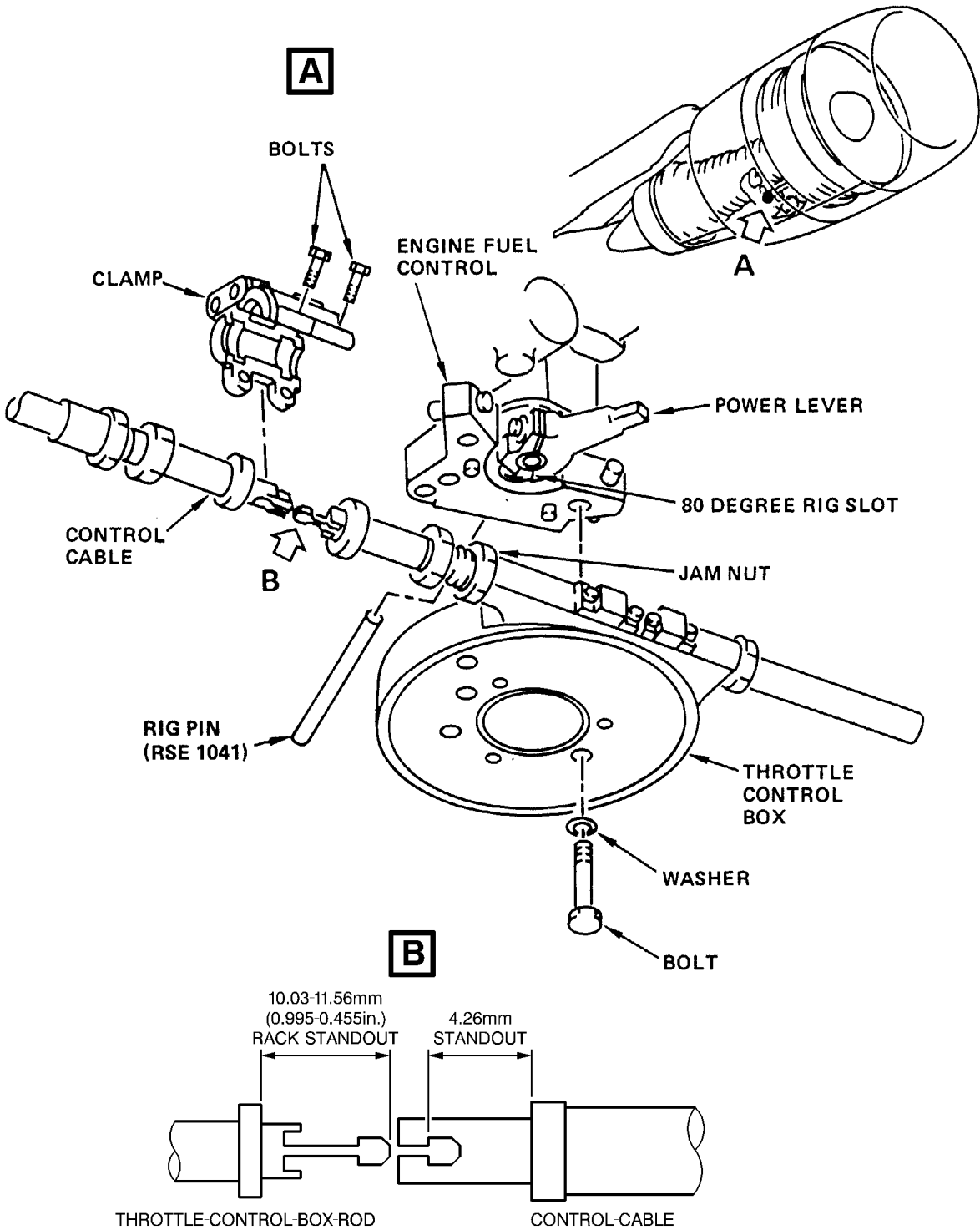
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Engine Control System

Figure 508

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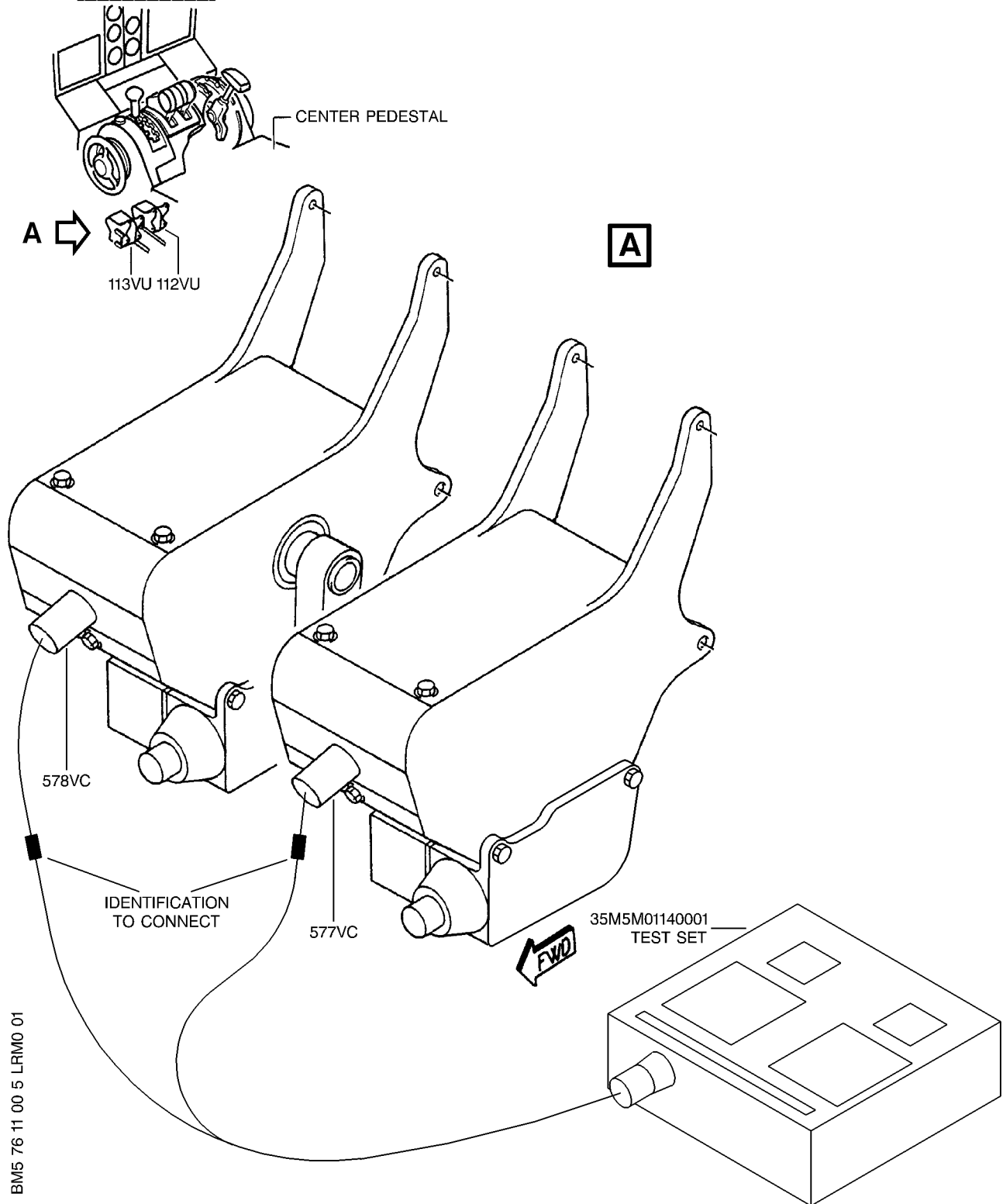
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Test Set - Thrust Reverser Microswitch  
Figure 509

R

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# AIRCRAFT MAINTENANCE MANUAL

## THROTTLE CONTROL LEVER - REMOVAL/INSTALLATION

### 1. Removal/Installation of the Bearing

#### A. Equipment and Materials

| ITEM              | DESIGNATION                                                  |
|-------------------|--------------------------------------------------------------|
| A. 98A27603006000 | Rigging Pin                                                  |
| B. 98A27603005000 | Rack Wrench                                                  |
| C.                | Torque Wrench-2 m.daN                                        |
| D.                | Circuit Breaker Safety Clips                                 |
| E.                | Corrosion Resistant Steel Lockwire dia.<br>0.02 in. (0.5 mm) |
| F.                | Cotter Pins                                                  |

#### Referenced Procedures

|                          |                              |
|--------------------------|------------------------------|
| - 22-10-00, P. Block 501 | Autopilot                    |
| - 25-11-11, P. Block 401 | Captains Seat                |
| - 25-11-12, P. Block 401 | First Officer's Seat         |
| - 27-41-11, P. Block 401 | Pitch Trim Control Mechanism |
| - 74-00-00, P. Block 501 | Ignition - General           |
| - 76-11-00, P. Block 501 | Throttle Controls            |

#### B. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

| PANEL | SERVICE                     | IDENT. | LOCATION |
|-------|-----------------------------|--------|----------|
| 21VU  | AFS/TCC/SYS 1/28VDC         | 306CJ1 | 102/H 8  |
| 21VU  | AFC/TCC/SYS 1/115VAC        | 308CJ1 | 102/H 9  |
| 21VU  | AFC/TCC/SENSORS             | 305CJ1 | 102/H10  |
| 21VU  | AFS/TCC/SYS 2/115VAC        | 308CJ2 | 102/H11  |
| 21VU  | AFS/TCC/SYS 2/28VDC         | 306CJ2 | 102/H12  |
| 133VU | ENG/ENG1&2/IGNITION/SYS A   | 1JH    | 334/S72  |
| 133VU | ENG/ENG1&2/IGNITION/SYS B   | 2JH    | 333/T72  |
| 133VU | ENG/ENG1&2/START CTL & WARN | 1KG    | 335/R68  |
| 133VU | ENG/ENG1/REV/CTL            | 1KM    | 332/U69  |
| 133VU | ENG/ENG2/REV/CTL            | 2KM    | 331/V74  |

(2)Remove Captain's seat (Ref. 25-11-11, P. Block 401).

(3)Remove First Officer's seat (Ref. 25-11-12, P. Block 401).

#### C. Removal of the Throttle Control Levers

(1)Removal of the identification plates (Ref. Fig. 402)

(a)Remove screws (1) and plate (2).

(b)Remove screws (3) and plate (4).

(2)Removal of the graduated gate (Ref. Fig. 403)

(a)Remove and retain screws (5) and (6).

(b)Remove position indexes (1) and (2).

(c)Remove screws (3) and (4) and graduated gate (7).

(3)Removal of the inside covers (6) from the throttle control levers

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- (Ref. Fig. 401).
- (a) Remove the three screws attaching each inside cover (6) to lever.
  - (b) Remove the covers.
- (4) Removal of the upper covers (Ref. Fig. 404).
- (a) Remove screws (1), (2), (4) and (5). Remove speedbrake control cover (3).
  - (b) Remove screws (6), (7), (9), and (10). Remove throttle control cover (8).
  - (c) Remove the screws (17) from the two brackets (16) supporting the throttle control cover and remove the bracket.
  - (d) Remove the screws (8) securing the handle to the flap control lever. Remove the pin (9) (Ref. Fig. 403).
  - (e) Remove the screws (11), (13), (14) and (15). Remove flap control handle cover (12) (Ref. Fig. 404).
- (5) Remove the screws (1) and remove the side cover (2) (Ref. Fig. 401).
- (6) Remove side plate (3) fitted with electrical connectors.
- (a) Disconnect and cap connectors.
  - (b) Cut and remove lockwire, remove and retain the four screws together with washers.
  - (c) At the three locations, cut and remove lockwire, remove and retain nut (14) together with washer (15).
  - (d) Remove screw (18) together with washer (17), remove the three clamps (16). Retain these parts for installation.
- (7) Remove screws (20) and remove lower side panel (4).
- (8) Repeat step (5) thru (7) on the left side of center pedestal.
- (9) Remove the LH and RH THS trim control wheels and the drive gears (Ref. 27-41-11, P. Block 401).
- (10) On the LH and RH, remove screw (19) and upper side panels (5) (Ref. Fig. 401).
- (11) Disconnect the dynamometric rod (Ref. Fig. 405).
- (a) At upper end of dynamometric rod (6) remove and discard cotter pin (1).
  - (b) Remove and retain nut (2), washer (3) and bush (4).
  - (c) Remove bolt (5) from rod/throttle lever connection. Retain bolt (5).
  - (d) Repeat steps (a) thru (d) for other rod.
- (12) Remove the six clamps (3) from frame (Ref. Fig. 406).
- (13) Mark position of electrical cables (1) with respect to fixed clamps (2).
- (14) Pull the electrical cables (1) inside the clamps (2) remaining fixed so as to leave some slack and permit disengagement of the throttle control lever.
- (15) Push inner shaft (6) from right to left to remove it (Ref. Fig. 407) (Sheet 1/2).
- NOTE** : LH bearing (7) and washer (5) are removed with inner shaft (6). RH bearing (3) remains in outer shaft (8). Hold washer (4) during removal and retain it.
- (16) Removal of outer shaft (8) (Ref. Fig. 407) (Sheet 2/2).
- NOTE** : Move outer shaft only sufficiently to clear throttle lever assy but still retain speedbrake control.
- (a) Remove lockwire from slotted nut (1).
  - (b) Using wrench 98A27603005000 remove slotted nut (1) and washer (2).
  - (c) Using rigging pin 98A27603006000 inserted in RH side of pedestal, push outer shaft to the left.

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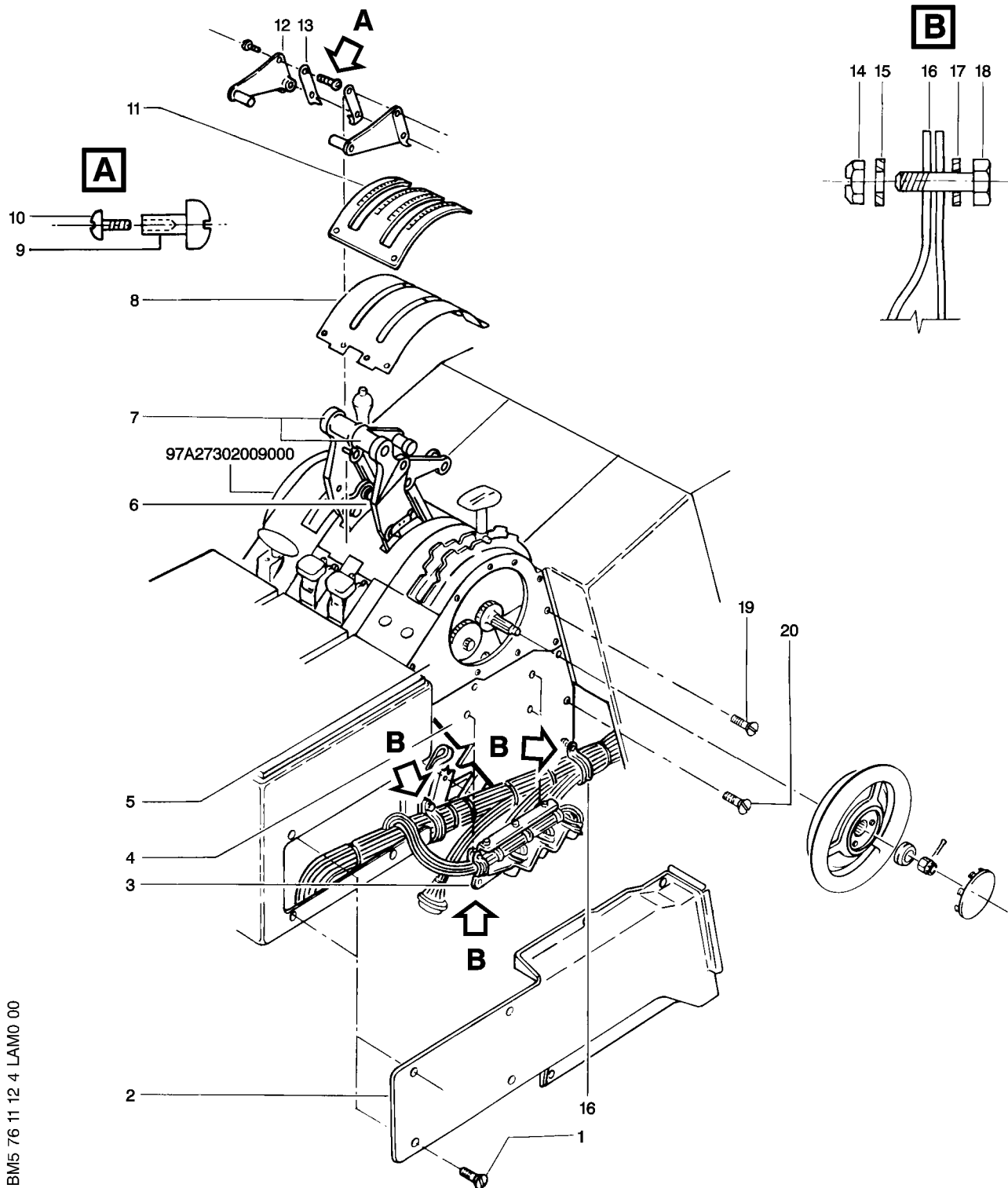
- (17) Remove screws (8) and adapters (9) from throttle control levers (7) (Ref. Fig. 405).
- (18) Move rigging pin 98A27603006000 to the right sufficient to clear throttle lever assembly but still retain flap/slat control.
- D. Replacement of Throttle Control Bearing (Ref. Fig. 408).**
- (1) Removal of throttle control bearings.
- (a) Pull out each throttle control handle to remove them from the tubular support (2) and the stop (1).
- NOTE** : The two bearings remain into the throttle control lever.
- (b) Remove the spacer (3), the bearing (4), the spacer (5), then the bearing (6).
- NOTE** : The bearings are installed tight fit and/or bonded.
- R (c) Unlock and unscrew the slotted nut (7).
- (2) Installation of throttle control bearings.
- R (a) Install the slotted nut (7), the bearing (6) then the spacer (5),
- R the bearing (4) and the spacer (3). **TORQUE** the slotted nut (7) to
- R between 2 and 3 m.daN (14.7 and 22.1 lbf.ft) and wirelock.
- (b) Reassemble the two throttle control handles on the tabular support (2) with the stop (1) installed.
- E. Installation of Throttle Control Levers**
- (1) Position throttle control levers with rigging pin 98A27603006000.
- (2) Put the harness in its initial position.
- (3) Install the six clamps (3) attaching the two cables to frame (Ref. Fig. 406).
- NOTE** : Install the six clamps with three self-locking nuts instead of nuts and cotter pins (if installed).
- (4) Install adapters (9) and secure with screws (8) (Ref. Fig. 405).
- (5) Connect dynamometric rods (Ref. Fig. 405).
- (a) Position rod (6) at throttle lever connection and insert bolt (5).
- (b) Install bush (4), washer (3) and nut (2).
- (c) Tighten nut (2).
- (d) Safety nut (2) with new cotter pin (1).
- (e) Repeat steps (a) thru (d) for other rod.
- (6) Progressively install outer shaft at the same time removing shaft rigging pin 98A27603006000 (Ref. Fig. 407) (Sheet 2/2).
- (7) Install washer (2) and slotted nut (1) using wrench 98A27603005000.
- (8) **TORQUE** slotted nut (1) to 2 m.daN (14.75 lbf.in.) and wirelock.
- (9) Install inner shaft (Ref. Fig. 407) (Sheet 1/2).
- (10) Install upper covers (Ref. Fig. 404).
- (a) Position speedbrake control cover (3) and install screws (1), (2), (4) and (5).
- (b) Install the two brackets (16) onto the frame.
- (c) Position throttle control cover (8) and install screws (6), (7), (9), and (10).
- (d) Position flap control handle cover (12) and install screws (11), (13), (14) and (15).
- (11) Install pin (9) and install the flap control lever handle with screw (8) (Ref. Fig. 403).
- (12) Install the graduated gate (Ref. Fig. 403).
- (a) Install graduated gate (7) and secure with screws (3) and (4).

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Access to Bearings  
Figure 401

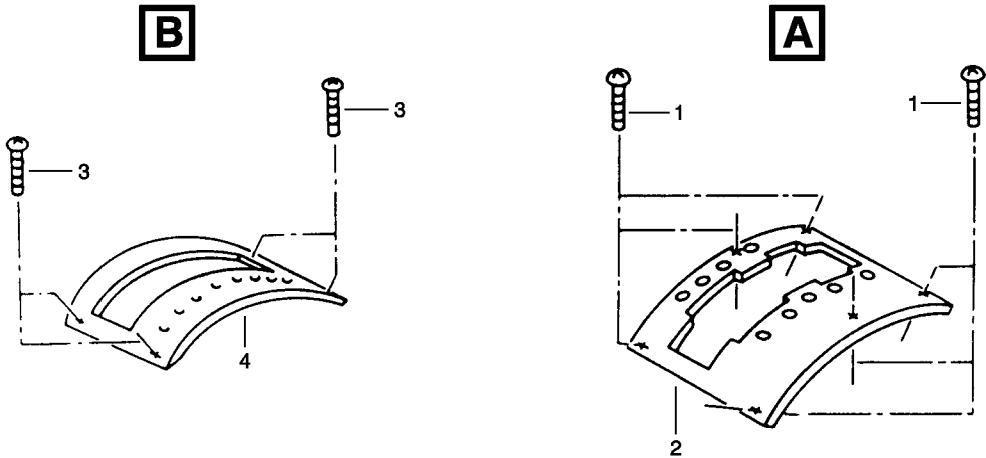
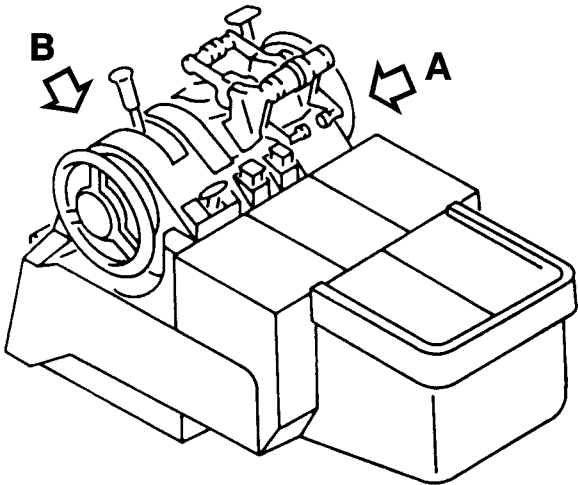
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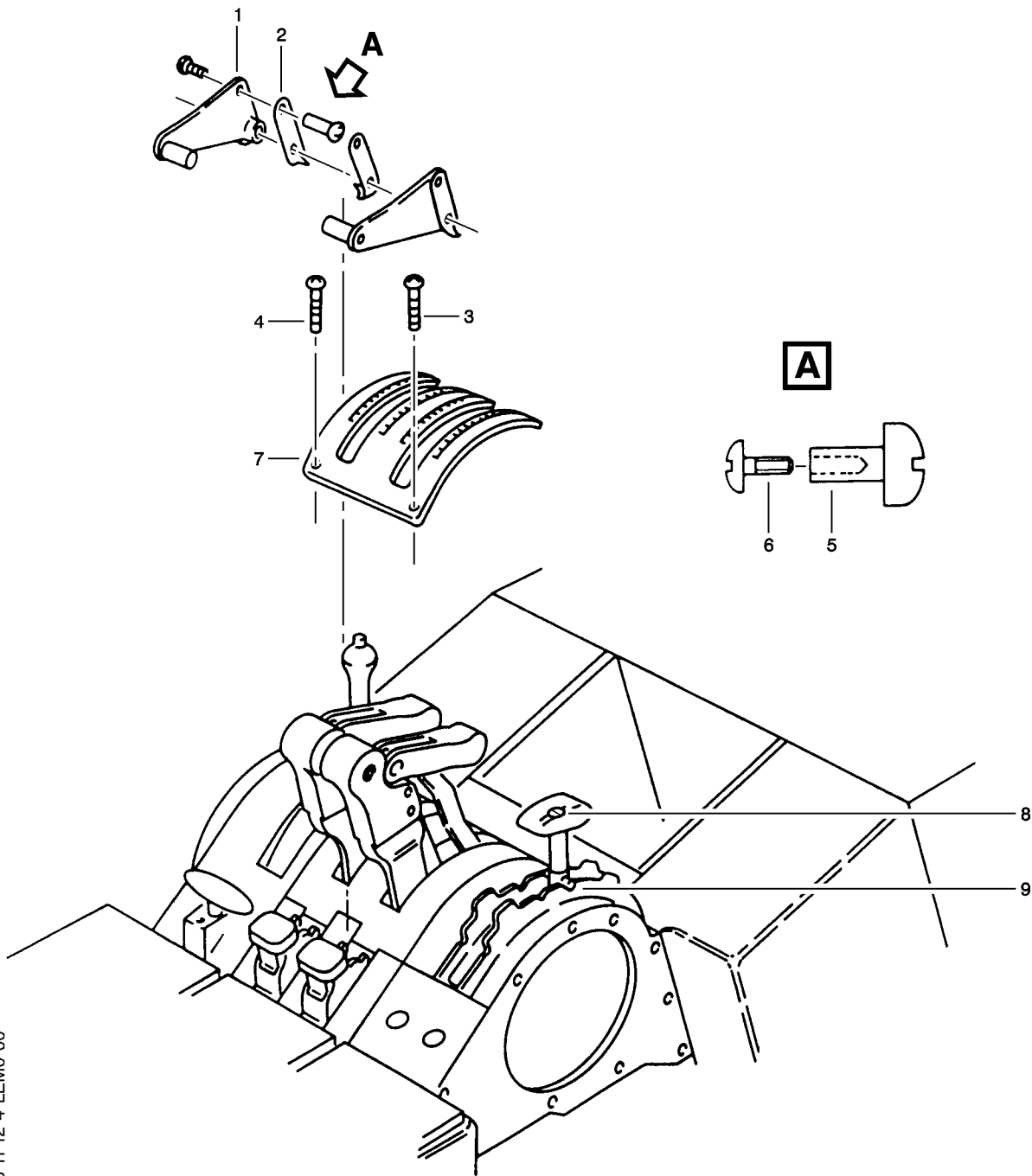
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Identification Plates

Figure 402

|   |                       |
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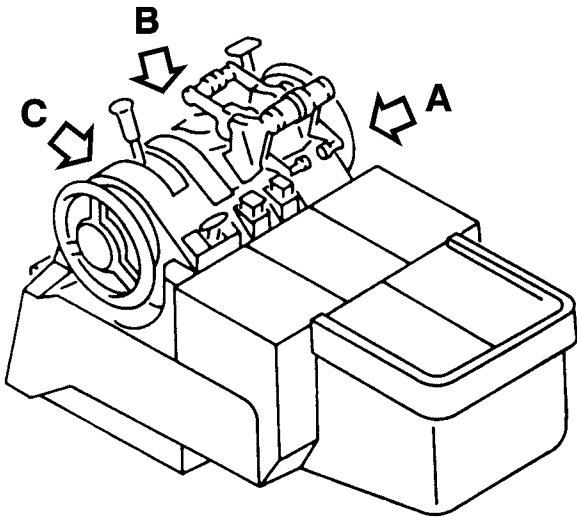
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Graduated Gate  
Figure 403

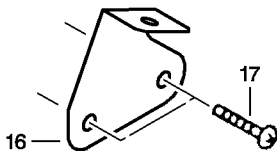
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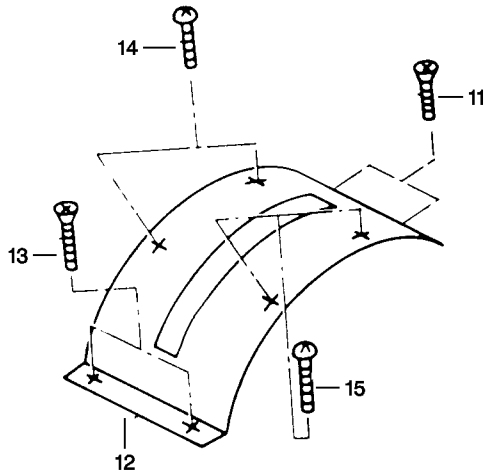
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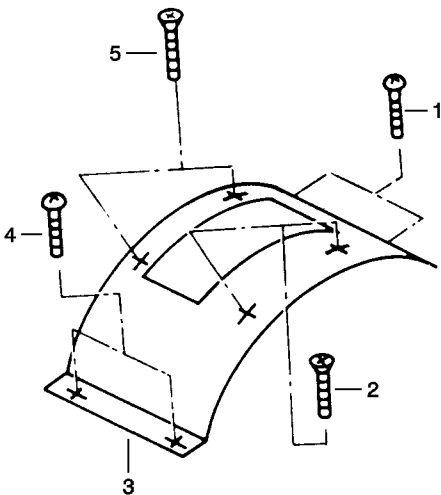
D



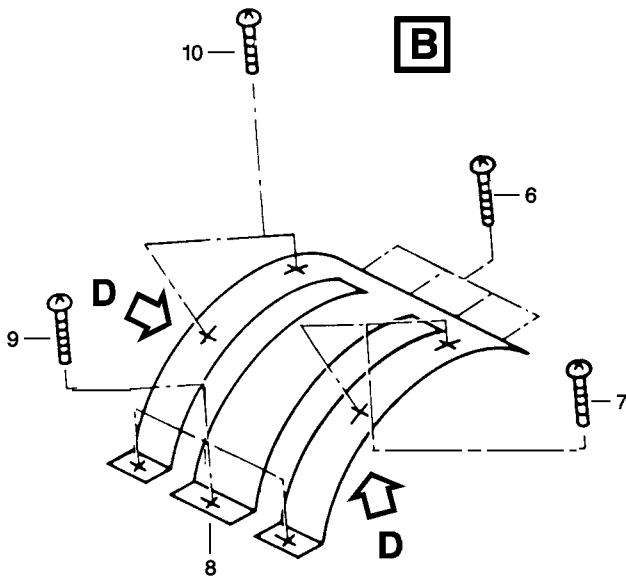
A



C



B



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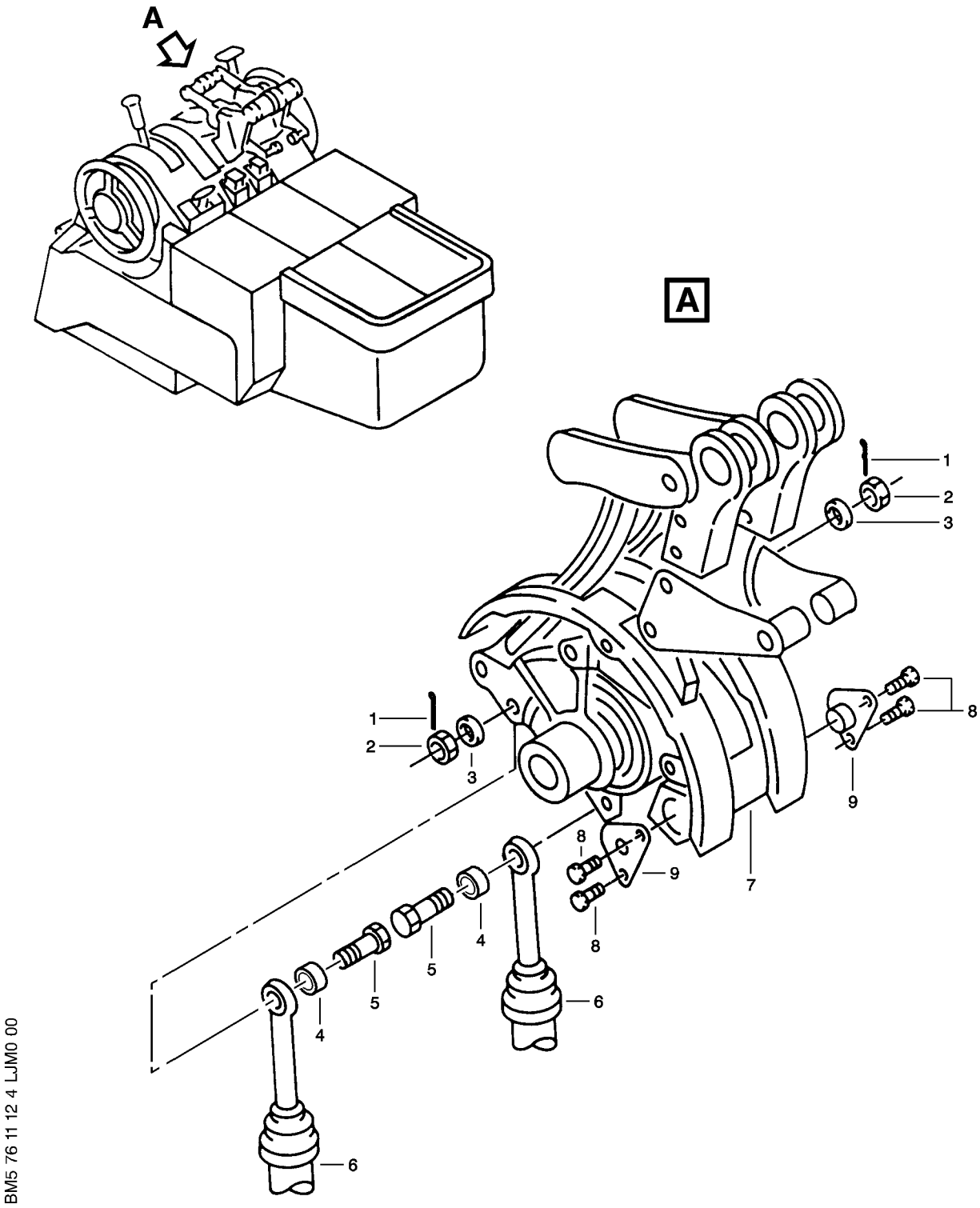
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Upper Covers  
Figure 404

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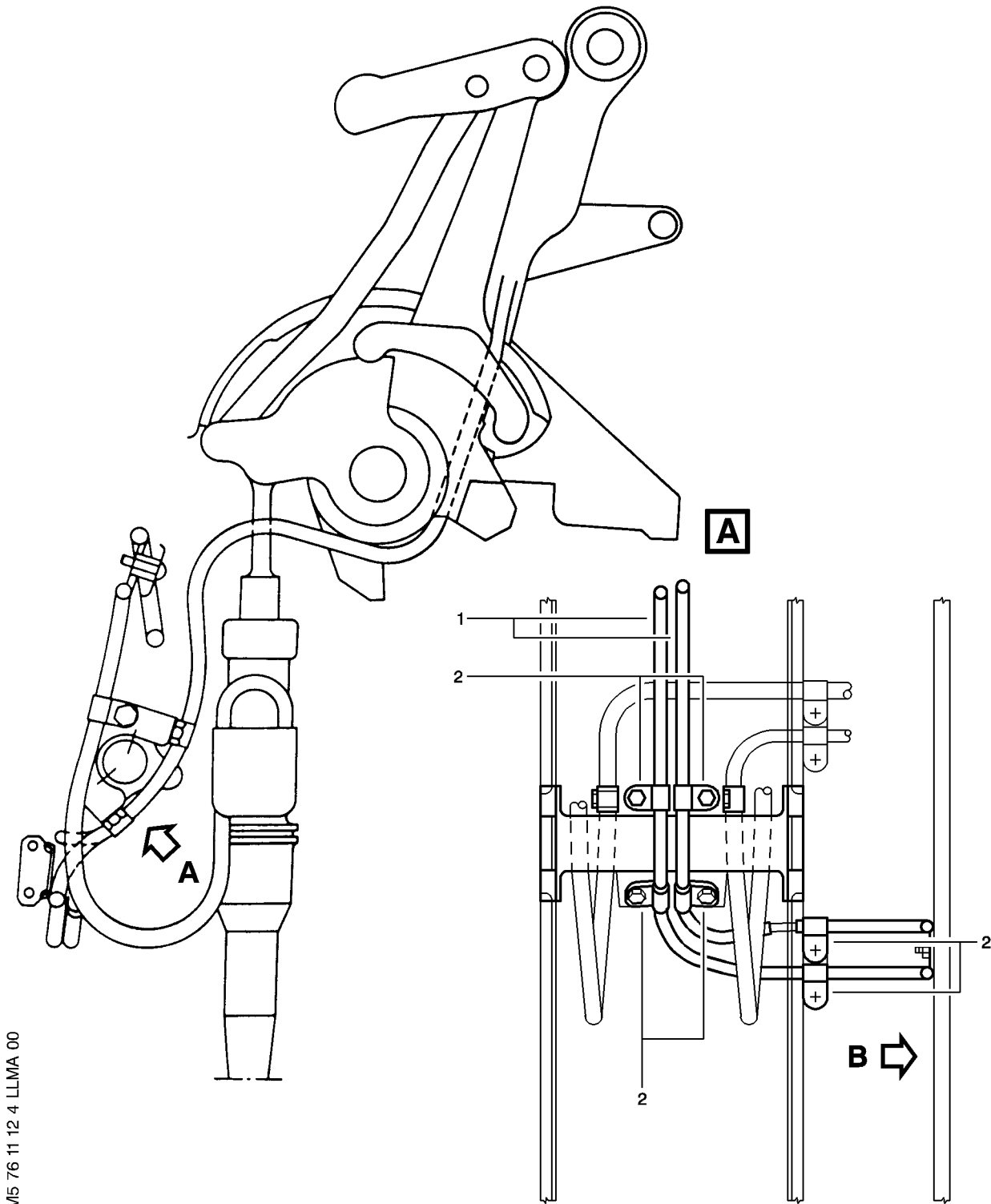


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Dynamometric Rod Attachment  
Figure 405

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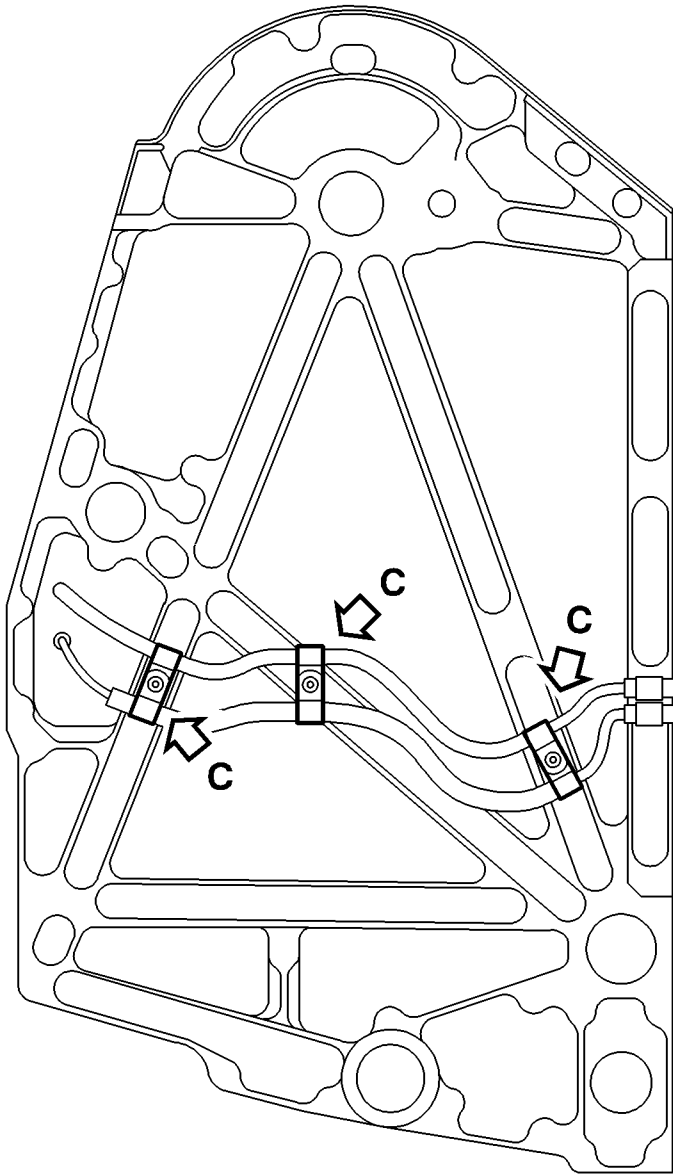
Electrical Routing (Sheet 1/2)

Figure 406

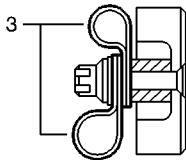
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C



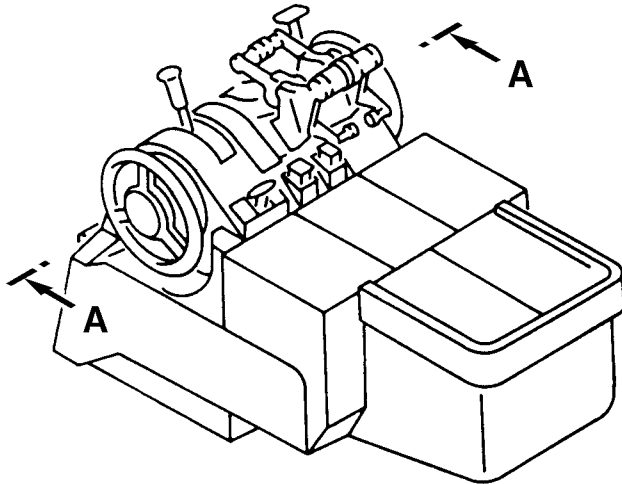
Electrical Routing (Sheet 2/2)

Figure 406

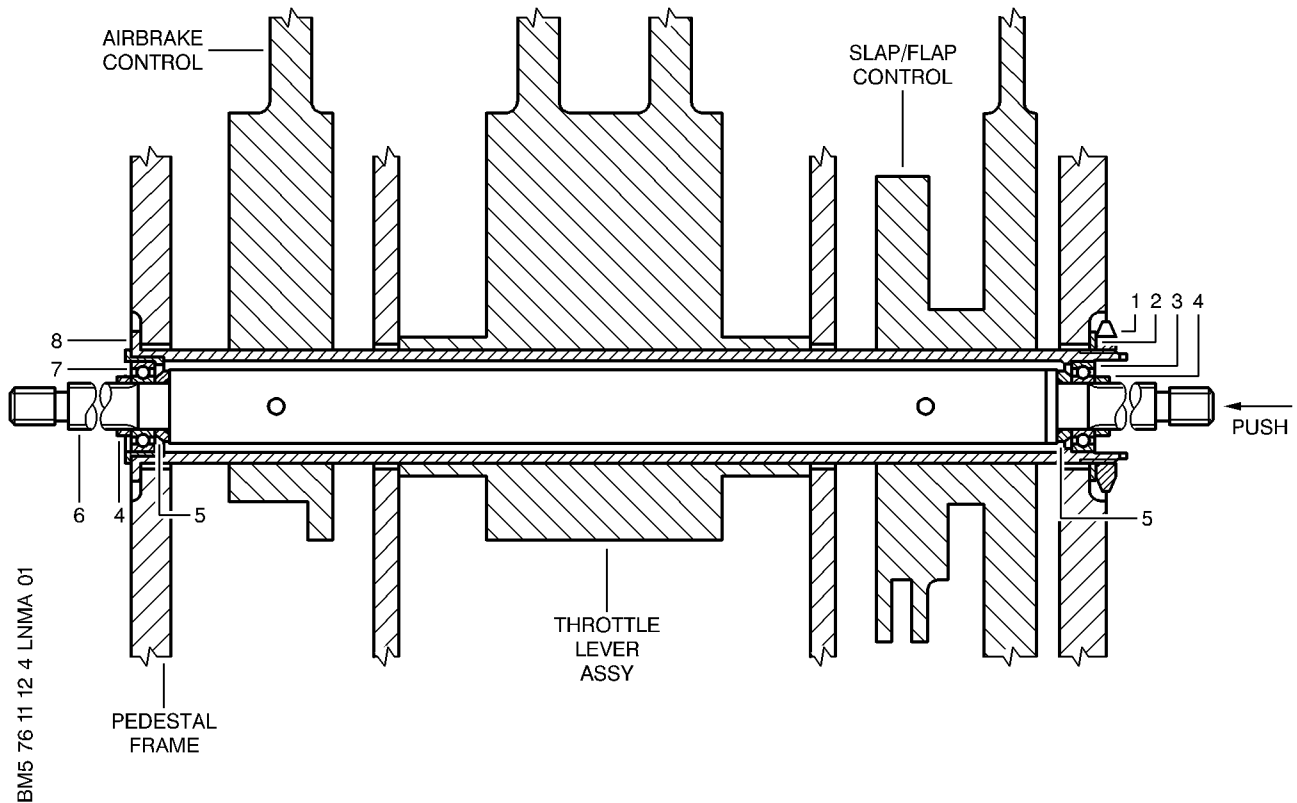
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|   |                                  |
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SECTION  
**A-A**



Shafts Removal (Sheet 1/2)  
Figure 407

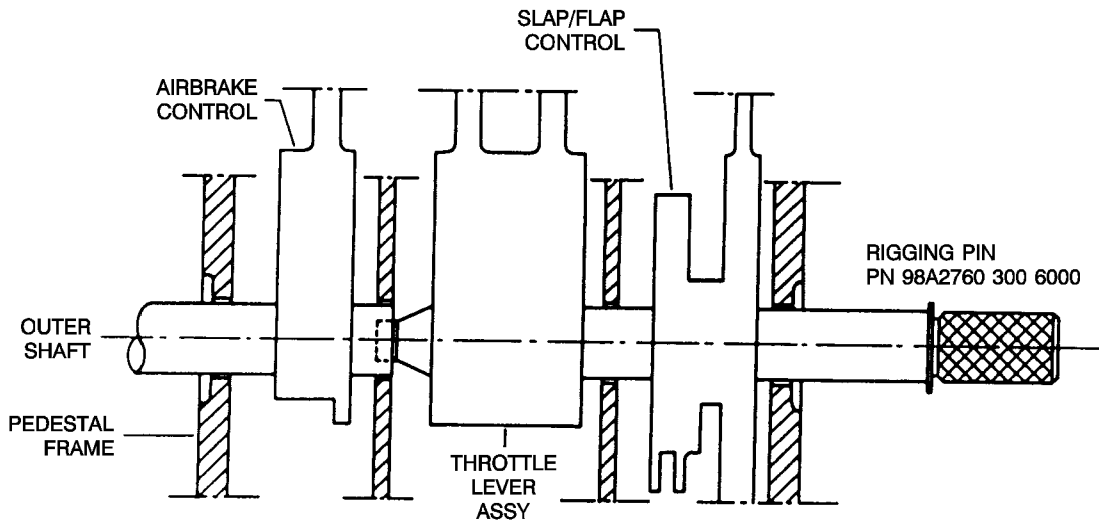
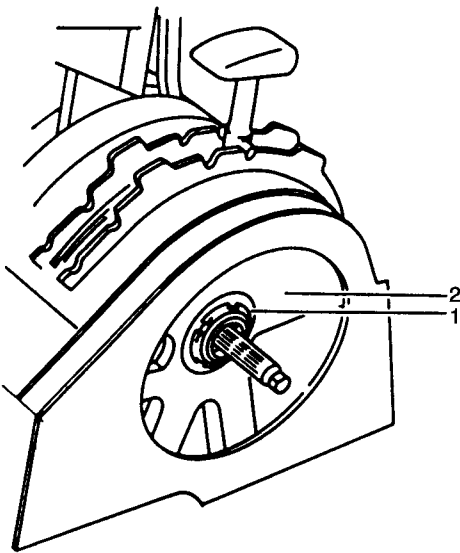
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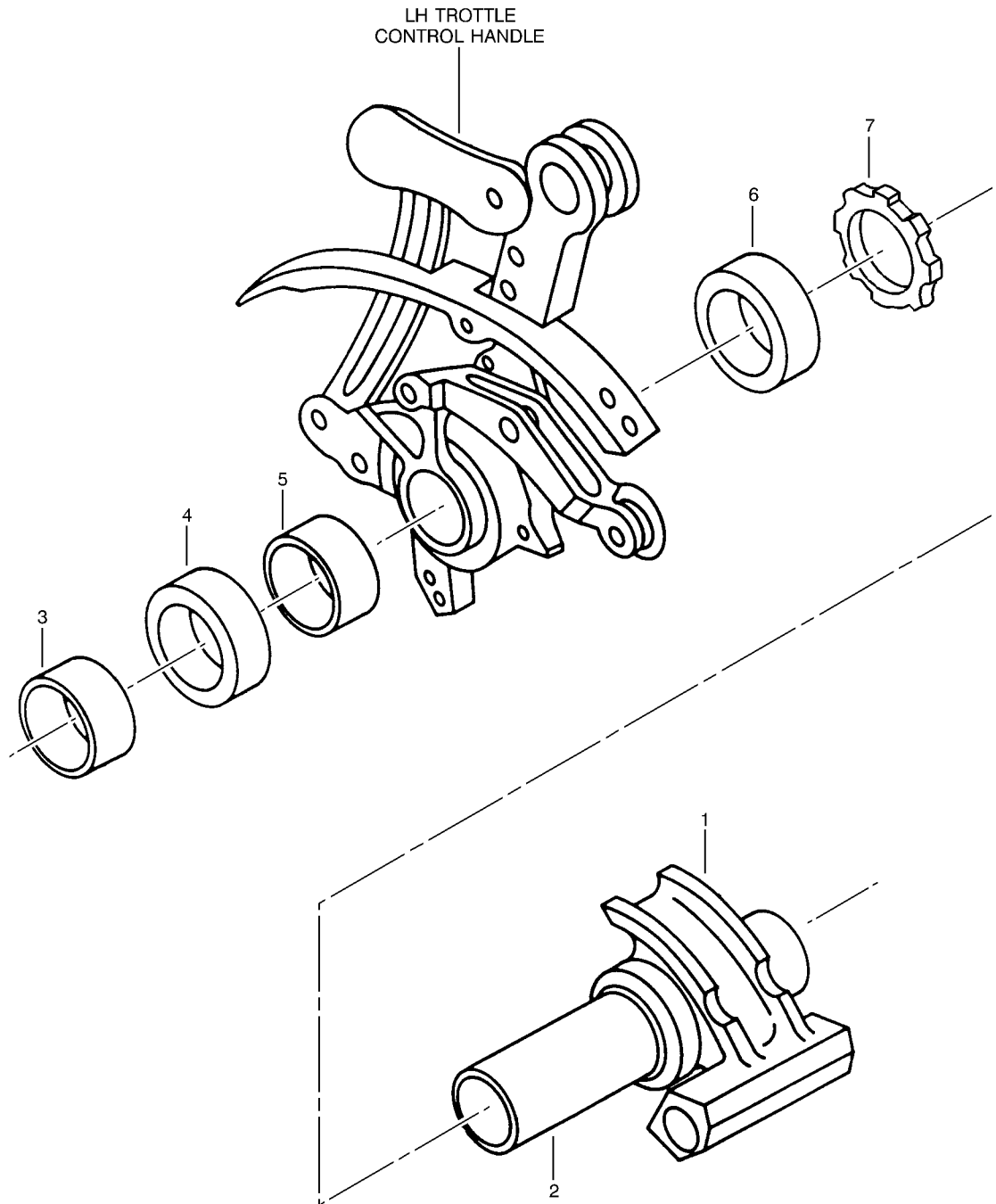
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Shafts Removal (Sheet 2/2)

Figure 407

|   |                       |
|---|-----------------------|
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Throttle Control Lever Bearing  
Figure 408

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- (b) Install position indexes (1) and (2) on throttle controls levers.
- (c) Install screws (5) and (6).
- (13) Install the identification plates (Ref. Fig. 402).
  - (a) Connect electrical connector to plate (2) and install screws (1).
  - (b) Connect electrical connector to plate (4) and install screws (3).
- (14) Install the inside covers with three screws.
- (15) Install right lower side panel (4) and secure with screws (Ref. Fig. 401).
- (16) Install side plate (3) supporting electrical connectors. Secure with the four screws and safety with 0.5 mm (0.02 in.) dia. lockwire.
- (17) Remove blanking caps and connect electrical connectors to side plate (3).
- (18) Install the three clamps (16).
  - (a) Install screw (18) together with washer (17).
  - (b) Install washer (15).
  - (c) Install nut (14), tighten and safety with 0.5 mm (0.02 in.) dia. lockwire.
- (19) Install upper side panel (5) and secure with screws (19).
- (20) Install side cover (2) and secure with screws (1).
- (21) On LH side of center pedestal, repeat step (15) thru (20).
- (22) Install the RH and LH pitch trim control wheel (Ref. 24-41-11, P. Block 401).
- (23) Install First Officer's seat (Ref. 25-11-12, P. Block 401).
- (24) Install Captain's seat (Ref. 25-11-11, P. Block 401).

**F. Test and Close-Up**

- (1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
- (2) Remove safety clips and tags, and close circuit breakers 306CJ1, 306CJ2, 308CJ1, 308CJ2, 305CJ1, 1JH, 2JH, 1KG, 1KM and 2KM.
- (3) Carry out functional test of pitch trim control mechanism (Ref. 27-41-11, P. Block 401).
- (4) Proceed with several complete cycles of throttle control lever and check that there is no friction point or binding in complete throttle and thrust reverser control lever travel.
- (5) Check throttle control effort and thrust reverser control lever effort (Ref. 76-11-00, P. Block 501).
- (6) Carry out the T0/GA lever test (Ref. 22-10-00, P. Block 501).
- (7) Carry out the test of start A and start B ignition system (Ref. 74-00-00, P. Block 501).
- (8) Make certain that throttle control levers are in idle position.

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## THROTTLE CONTROL LEVER - INSPECTION/CHECK

### 1. Inspection/Check of Throttle Control Assembly

#### A. Equipment and Materials

| ITEM | DESIGNATION    |
|------|----------------|
| (1)  | Brush          |
| (2)  | Vacuum Cleaner |

#### B. Job Set-Up

(1) Open, safety and tag the following circuit breakers :

| PANEL | SERVICE                     | IDENT. | LOCATION |
|-------|-----------------------------|--------|----------|
| 133VU | ENG/ENG1&2/IGNITION/SYS A   | 1JH    | 334/S72  |
| 133VU | ENG/ENG1&2/IGNITION/SYS B   | 2JH    | 333/T72  |
| 133VU | ENG/ENG1&2/START CTL & WARN | 1KG    | 335/R68  |

(2) Removal of the identification plates (Ref. Fig. 601).

(a) Remove screws (1) and plate (2).

(b) Remove screws (3) and plate (4).

(c) Remove screw (8) and plate (9) (Ref. Fig. 602).

(3) Removal of the graduated gate (Ref. Fig. 602).

(a) Remove and retain screws (5) and (6).

(b) Remove position indexes (1) and (2).

(c) Remove screws (3) and (4) and graduated gate (7).

(4) Removal of the inside covers (10) from the throttle control levers (Ref. Fig. 602).

(a) Remove the three screws attaching each inside cover (10) to lever.

(b) Remove the cover.

(5) Removal of the upper cover (Ref. Fig. 603).

(a) Remove screws (1), (2), (4) and (5). Remove throttle control cover (3).

#### C. Cleaning and Inspection Procedure

(1) Clean the throttle control assembly inside the center pedestal, with a brush and a vacuum cleaner.

(2) Inspect the throttle control assembly for potential corrosion, rubbing traces of wear and degradation.

#### D. Close-Up

(1) Install upper cover (Ref. Fig. 603).

(a) Position throttle control cover (3) and install screws (1), (2), (4) and (5).

(2) Install the graduated gate (Ref. Fig. 602).

(a) Install graduated gate (7) and secure with screws (3) and (4).

(b) Install position indexes (1) and (2) on throttle control levers.

(c) Install screws (5) and (6).

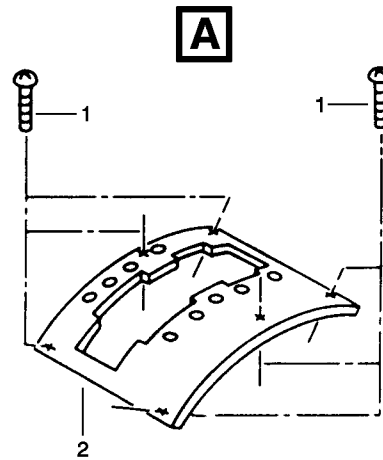
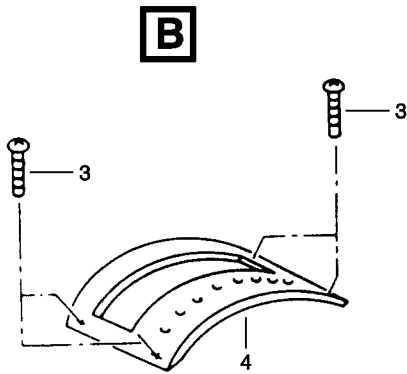
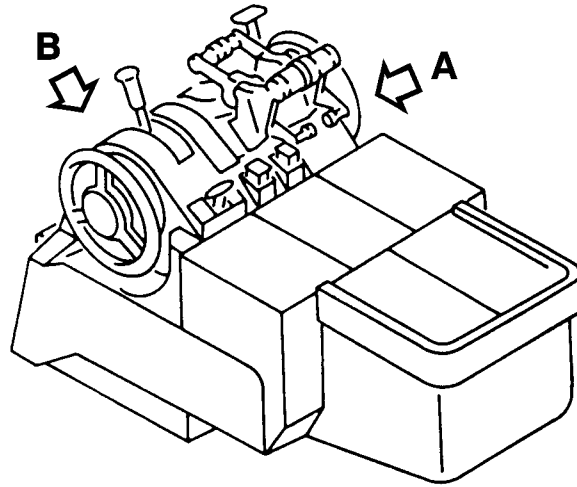
(3) Install the identification plates (Ref. Fig. 601).

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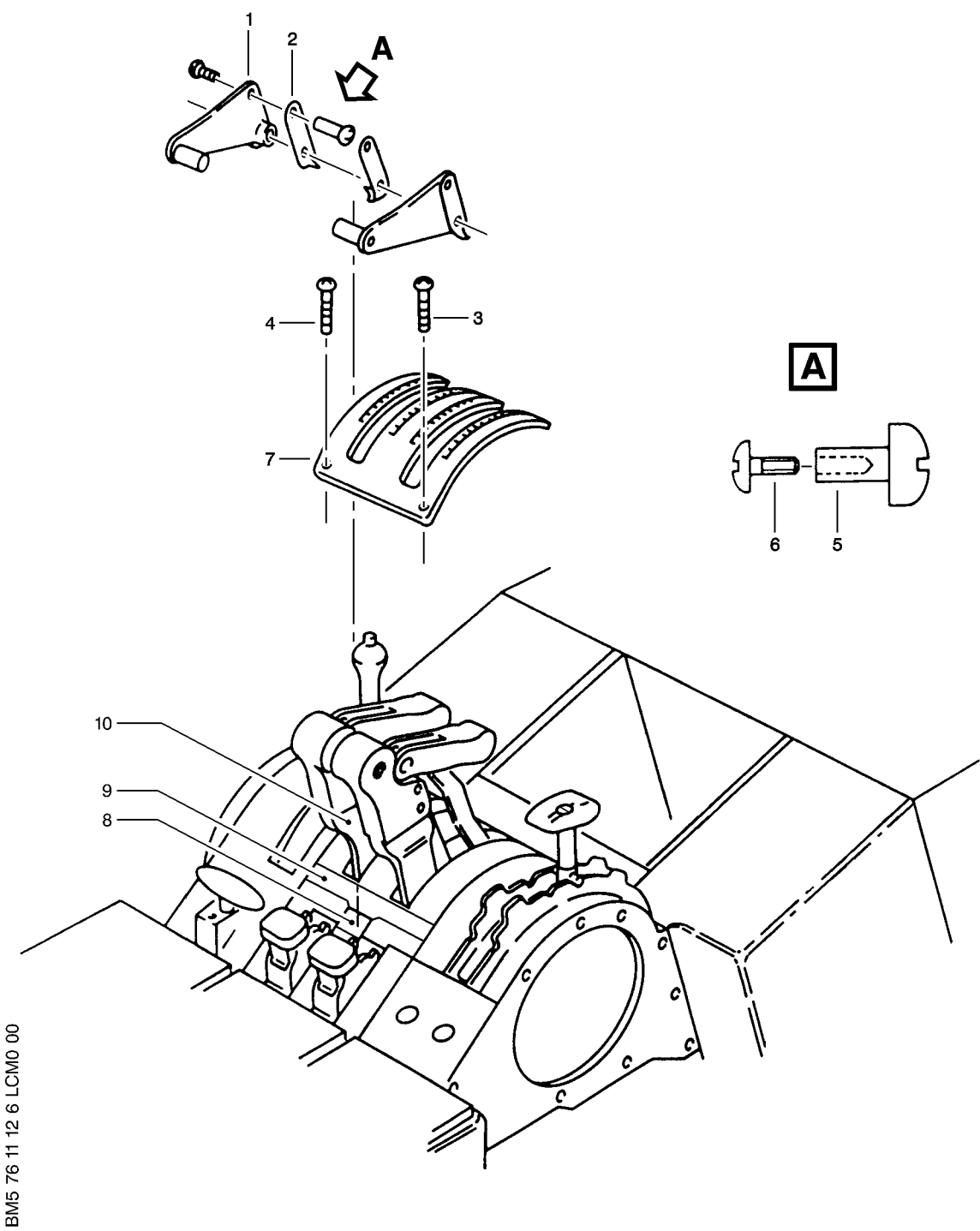
Identification Plates  
Figure 601

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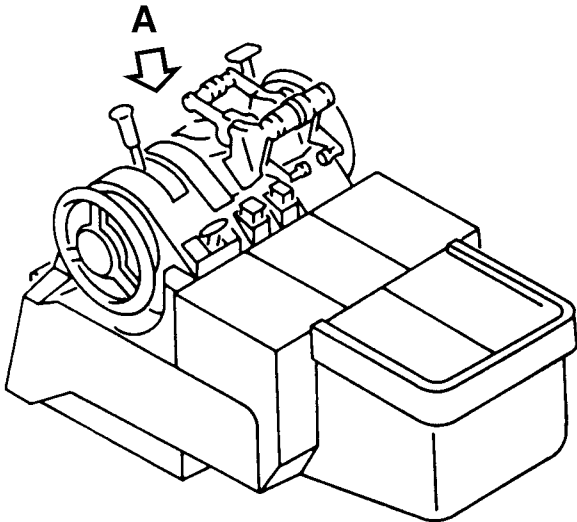


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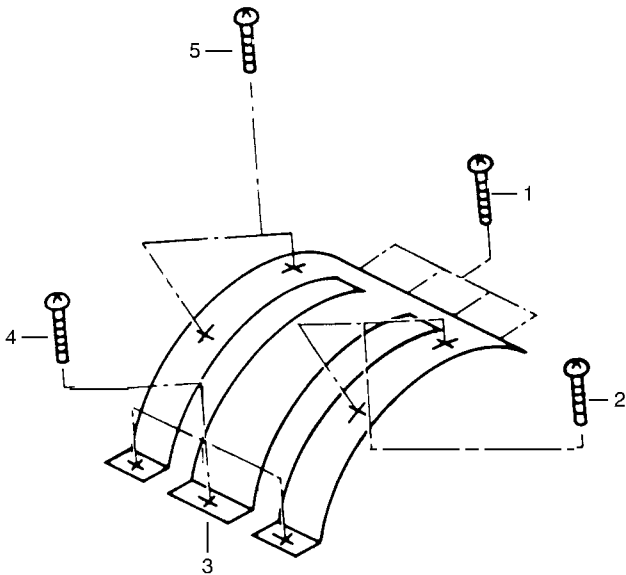
Graduated Gate  
Figure 602

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A



Upper Cover

Figure 603

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- (a) Connect electrical connector to plate (2) and install screws (1).
- (b) Connect electrical connector to plate (4) and install screws (3).
- (c) Connect electrical connector to plate (9) and install screw (8)  
(Ref. Fig. 602).
- (4) Install the inside covers with three screws.
- (5) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
- (6) Remove safety clips and tags, and close circuit breakers 1JH, 2JH and 1KG.
- (7) Proceed with several complete cycles of throttle control lever and check that there is no friction point or binding in complete throttle and thrust reverser control lever travel.
- (8) Make certain that throttle control levers are in idle position.

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## AIRCRAFT MAINTENANCE MANUAL

### DYNAMOMETRIC ROD - REMOVAL/INSTALLATION

**WARNING** : BEFORE ATTEMPTING ANY MAINTENANCE PROCEDURES ON CENTER CONTROL PEDESTAL, MAKE CERTAIN THAT WARNING NOTICES AND SAFETY BARRIERS ARE IN PLACE.

**NOTE** : Dynamometric rods being identical, only one removal/installation is described.

#### 1. Equipment and Materials

| ITEM                     | DESIGNATION                                  |
|--------------------------|----------------------------------------------|
| A. 97A27302009000        | Locking Equipment - Pitch Trim Control Wheel |
| B.                       | Access Platform                              |
| C. 98A27901005000        | Pin - Rigging, Cable Tension Regulator       |
| D. 99A76101003000        | Pin - Rigging Microswitch Unit               |
| E. 72-5-644              | Retaining Fork - Dynamometric Rod            |
| F.                       | Circuit Breaker Safety Clips                 |
| G.                       | Corrosion - Resistant Steel Lockwire         |
| H.                       | Blanking Plugs/Caps                          |
| I.                       | Warning Notices                              |
| Referenced Procedures    |                                              |
| - 25-11-12, P. Block 401 | First Officer Seat                           |
| - 27-41-11, P. Block 401 | Pitch Trim Control Mechanism                 |
| - 22-30-00, P. Block 501 | Autothrottle Control                         |
| - 25-11-12, P. Block 501 | First Officer Seat                           |
| - 29-10-00, P. Block 301 | Main Hydraulic Power                         |
| - 22-10-00, P. Block 501 | Autopilot                                    |
| - 74-00-00, P. Block 501 | Ignition - General                           |

#### 2. Procedure

##### A. Job Set-Up

(1) Open, safety and tag the following circuit breakers :

| PANEL | SERVICE                     | IDENT. | LOCATION |
|-------|-----------------------------|--------|----------|
| 21VU  | AFS/TCC/SYS 1/28VDC         | 306CJ1 | 102/H 8  |
| 21VU  | AFC/TCC/SYS 1/115VAC        | 308CJ1 | 102/H 9  |
| 21VU  | AFC/TCC/SENSORS             | 305CJ1 | 102/H10  |
| 21VU  | AFS/TCC/SYS 2/115VAC        | 308CJ2 | 102/H11  |
| 21VU  | AFS/TCC/SYS 2/28VDC         | 306CJ2 | 102/H12  |
| 133VU | ENG/ENG1&2/IGNITION/SYSA    | 1JH    | 334/S72  |
| 133VU | ENG/ENG1&2/IGNITION/SYSB    | 2JH    | 333/T72  |
| 133VU | ENG/ENG1&2/START CTL & WARN | 1KG    | 335/R68  |
| 133VU | ENG/ENG1/REV/CTL            | 1KM    | 332/U69  |
| 133VU | ENG/ENG2/REV/CTL            | 2KM    | 331/V74  |

(2) Position access platform at forward cargo compartment.

(3) On panels 429VU and 9VU

- display warning notices prohibiting operation of throttle control

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- levers, pitch trim control wheel and flap and slat control lever.  
(4) Remove First Officer's seat (Ref. 25-11-12, P. Block 401).  
(5) In avionics compartment, open access door 121BL.  
(6) Depressurize hydraulic systems (Ref. 29-10-00, P. Block 301).  
(7) Install locking equipment 97A27302009000 in left pitch trim control wheel on mechanical center pedestal.  
(Ref. Fig. 401)  
(Ref. Fig. 402)

**B. Removal**

**NOTE** : Before removal, make certain that ENG 1 and ENG 2 HP fuel shut-off valve control levers are in OFF position.

- (1) Remove right pitch trim control wheel (Ref. 27-41-11, P. Block 401).
- (2) Remove screws (20) and side cover (21).
- (3) Remove screws (17) and upper side panel (24).
- (4) Remove side plate (22) fitted with electrical connectors.
  - (a) Disconnect and cap connectors.
  - (b) Cut and remove lockwire, remove and retain the four screws together with washers.
- (5) Remove clamp (5).
  - (a) Cut and remove lockwire, remove and retain nut (3) together with washer (4).
  - (b) Remove screw (7) together with washer (6), remove the three clamps (19). Retain these parts for installation.
- (6) Remove screws (18) and remove lower side panel (23).
- (7) At upper part of center pedestal, remove position indexes (1) and (2) from throttle control levers (14).
  - (a) Remove and retain screws (33) and (34).
  - (b) Remove position indexes (1) and (2).
- (8) Remove the three screws attaching the inside cover (31). Remove the cover.
- (9) Remove screws and casing (32) protecting throttle control levers (14).
- (10) Remove the two screws attaching the ON-FUEL-OFF plate (30). Remove the plate.
- (11) Disconnect connector (15) from dynamometric rod ; cap plug and receptacle.
- (12) Remove the three cable clamps (26).
  - (a) Remove and discard cotter pin (29).
  - (b) Remove and retain nut (28) together with washer (27).
  - (c) Remove and retain screw (25) and clamp (26).
- (13) Remove dynamometric rod attaching parts, commencing with lower attachment, then upper attachment.
  - (a) Check that throttle control lever and thrust reverser control lever are in FIT position.
  - (b) At lower attachment, remove and discard cotter pin (9).
  - (c) Remove and retain nut (8) together with washer (10).
  - (d) Move thrust reverser control lever in RFT position.
  - (e) Remove bolt (13) together with spacer (12).
  - (f) At upper attachment, remove and discard cotter pin (9).
  - (g) Remove and retain nut (8) together with washer (10).
  - (h) Remove the bolt (13) together with spacer (12).

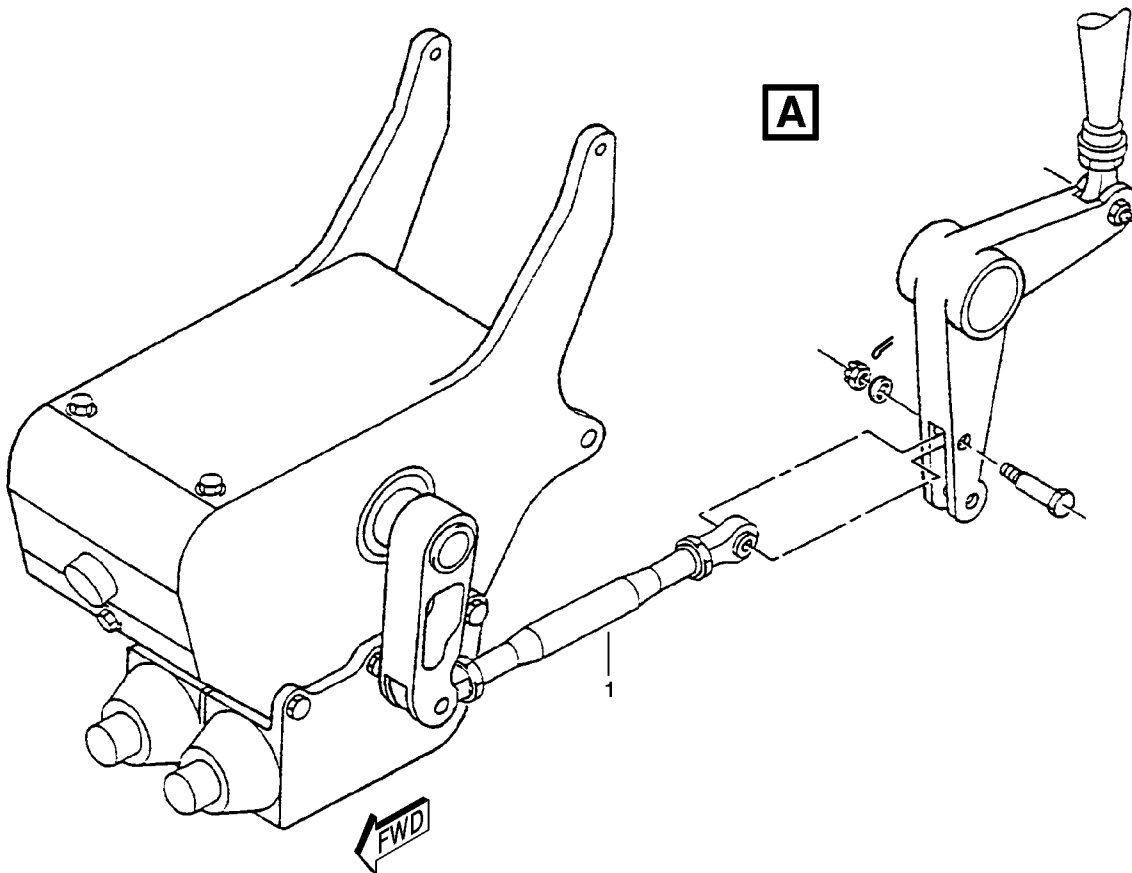
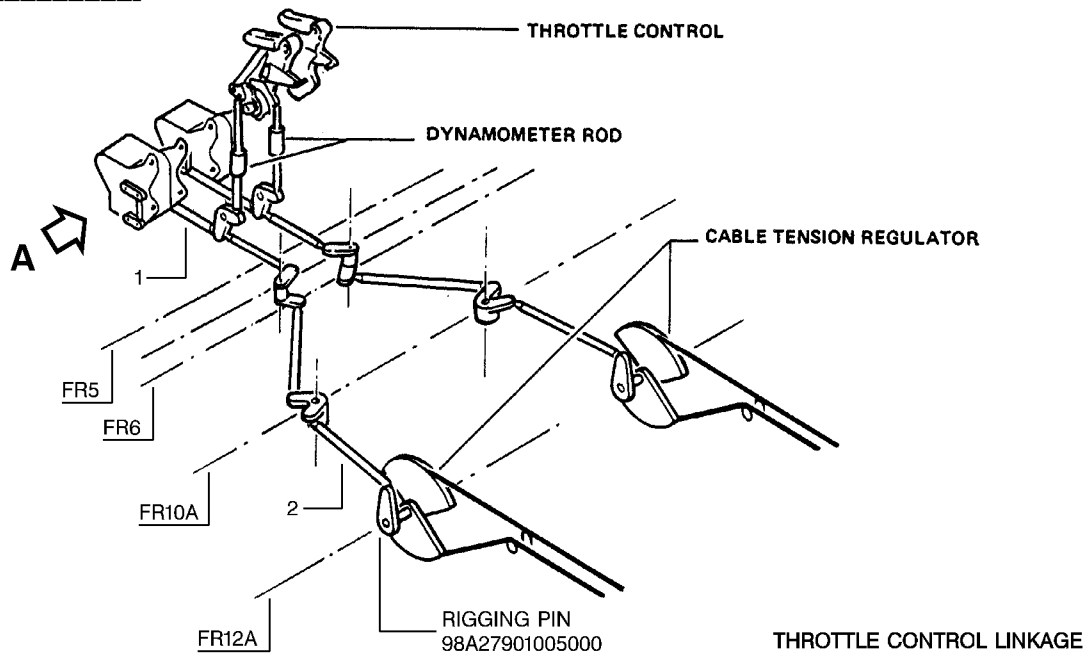
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Component Location  
Figure 401

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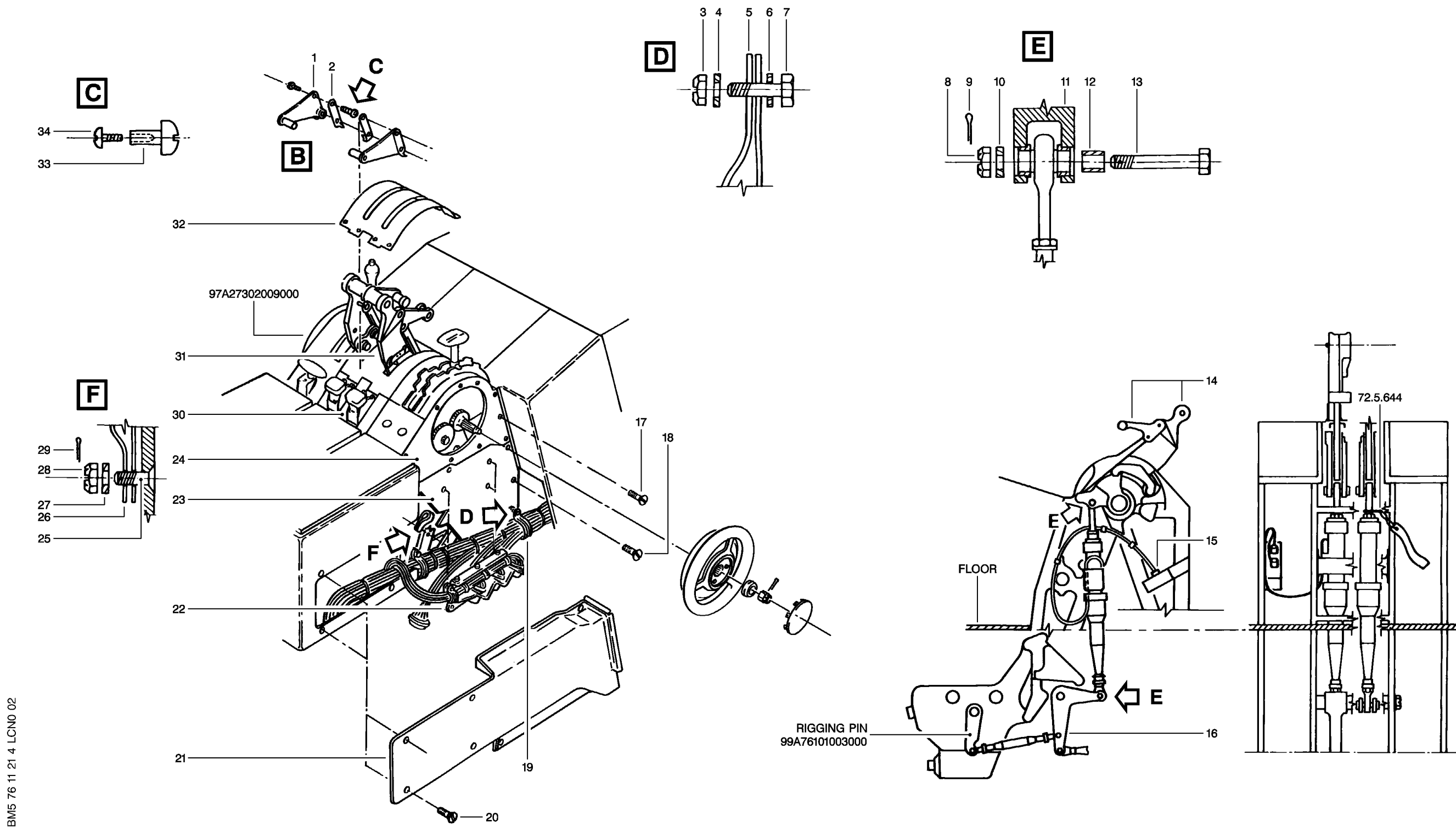
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Dynamometric Rod

Figure 402

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(14) Disengage dynamometric rod from yoke fittings (11), commencing with lower fitting.

**C. Preparation of Replacement Component**

- (1) Make certain that replacement component is clean and free from damage or corrosion.
- (2) Make certain that replacement component is fitted with retaining fork item 72-5-644.

**D. Installation**

(Ref. Fig. 402)

- (1) Pivot lever (14) as in RFT position, and lever (16) counterclockwise.
- (2) Engage lower eye-end fitting of dynamometric rod in yoke fitting (11).
- (3) Install the lower attachment of dynamometric rod.
  - (a) Install bolt (13) together with spacer (12).
  - (b) Install washer (10), nut (8) and safety with cotter pin (9).
- (4) Position the upper eye-end fitting of dynamometric rod in yoke fitting (11).
- (5) Install the upper attachment of dynamometric rod.
  - (a) Install bolt (13) together with spacer (12).
  - (b) Install washer (10), nut (8) and safety with cotter pin (9).
- (6) Pivot lever (14) as in FIT position and make certain that control lever is immobilized in FIT position.
- (7) Install rigging pin 99A76101003000 in microswitch unit 112VU (113VU).
- (8) If the rigging is not correct, adjust length of adjustable rod (1) (Ref. Fig. 401).
- (9) On cable tension regulator corresponding to dynamometric rod removed, install rigging pin 98A27901005000.
- (10) If the rigging pin is not correct, adjust length of adjustable rod (2).
- (11) Remove the rigging pins from the cable tension regulator and the microswitch unit.
- (12) Install the three clamps (26) to hold rod cables.
  - (a) Install screw (25).
  - (b) Install clamp (26) together with washer (27).
  - (c) Install and tighten nut (28) and safety with cotter pin (29).
- (13) Remove blanking caps, connect electrical connector (15).
- (14) Remove dynamometric rod retaining fork item 72-5-644.
- (15) Install right lower side panel (23) and secure with screws.
- (16) Install side plate (22) supporting electrical connectors. Secure with the four screws and safety with 0.5 mm (0.02 in.) dia. lockwire.
- (17) Remove blanking caps and connect electrical connectors to side plate (22).
- (18) Install clamp (19).
  - (a) Install screw (7) together with washer (6).
  - (b) Install washer (4).
  - (c) Install nut (3), tighten and safety with 0.5 mm (0.02 in.) dia. lockwire.
- (19) Install upper side panel (24) and secure with screws (17).
- (20) Install side cover (21) and secure with screws (20).
- (21) Install right pitch trim control wheel (Ref. 27-41-11, P. Block 401).
- (22) Install casing (32) protecting throttle control levers (14) and secure

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- with screws.
- (23) Install position indexes (1) and (2) on throttle control levers (14).
    - (a) Install position index (1) and secure with screw (33).
    - (b) Install position index (2) diametrically opposed and secure with screw (34).
  - (24) Install ON-FUEL-OFF plate (30) and tighten the two screws.
  - (25) Install inside cover (31) on to lever and tighten the three screws.

**E. Test**

- (1) Remove locking equipment 97A27302009000 from left pitch trim control wheel.
- (2) Pressurize hydraulic systems (Ref. 29-10-00, P. Block 301).
- (3) Remove safety clips and tags, and close circuit breakers 308CJ1, 306CJ1, 305CJ1, 306CJ2, 308CJ2, 1JH, 2JH, 1KG, 1KM and 2KM.
- (4) Carry out operational test of autothrottle control (Ref. 22-30-00, P. Block 501).
- (5) Carry out the T0/GA lever test (Ref. 22-10-00, P. Block 501).
- (6) Carry out the test of start A and start B ignition system (Ref. 74-00-00, P. Block 501).

**F. Close-Up**

- (1) Install First Officer's seat (Ref. 25-11-12, P. Block 401) and carry out operational test (Ref. 25-11-12, P. Block 501).
- (2) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
- (3) Make certain that the throttle control levers move freely, without friction between fixed and movable parts in the working area.
- (4) In avionics compartment, close access door 121BL.
- (5) Remove warning notices.
- (6) Remove access platform.
- (7) Make certain that throttle control levers are in idle position.

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## AIRCRAFT MAINTENANCE MANUAL

### THROTTLE CONTROL MICROSWITCH UNIT - REMOVAL/INSTALLATION

**WARNING :** BEFORE PROCEEDING WITH MAINTENANCE WORK ON MICROSWITCH UNIT, THROTTLE CONTROL LEVERS SHALL BE IMMOBILIZED IN IDLE POSITION.  
AS A SAFETY PRECAUTION DISPLAY A WARNING NOTICE ON THE LEVERS.

**NOTE :** Removal/installation procedures for both left and right microswitch units are identical.

#### 1. Equipment and Materials

| ITEM                     | DESIGNATION                                                    |
|--------------------------|----------------------------------------------------------------|
| A.                       | Access Platform, Forward Cargo Compt. 2.70 m. (9 ft.)          |
| B. 99A76101003000        | Pin-Rigging, Throttle Control Microswitch Unit                 |
| C. 98A27901005000        | Pin-Rigging, Cable Tension Regulator                           |
| D. 97A76102500002        | Quadrant - Graduated, Throttle and Thrust Reverser Controls    |
| E. 35M5M01140001         | Test Set - Thrust Reverser Microswitch                         |
| F.                       | Circuit Breaker Safety Clips                                   |
| G.                       | Cotter Pins                                                    |
| H.                       | Corrosion - Resistant Steel Lockwire Dia. 0.032 in. (0.813mm). |
| J.                       | Blanking Plugs/Caps                                            |
| K.                       | Warning Notices                                                |
| Referenced Procedures    |                                                                |
| - 21-31-00, P. Block 501 | Cabin Pressure Control and Monitoring                          |
| - 22-33-16, P. Block 401 | Throttle Position Detector                                     |
| - 24-41-00, P. Block 301 | AC External Power Control                                      |
| - 27-61-00, P. Block 501 | Electrical and Mechanical Control (Spoilers and Speed Brakes)  |

#### 2. Procedure

R \*\*ON A/C 001-100,

R Post SB 78-2011 For A/C 001-100,

### THROTTLE CONTROL MICROSWITCH UNIT - REMOVAL/INSTALLATION

**WARNING :** BEFORE PROCEEDING WITH MAINTENANCE WORK ON MICROSWITCH UNIT, THROTTLE CONTROL LEVERS SHALL BE IMMOBILIZED IN IDLE POSITION.  
AS A SAFETY PRECAUTION DISPLAY A WARNING NOTICE ON THE LEVERS.

**NOTE :** Removal/installation procedures for both left and right microswitch units are identical.

#### 1. Equipment and Materials

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| ITEM                     | DESIGNATION                                                       |
|--------------------------|-------------------------------------------------------------------|
| A.                       | Access Platform, Forward Cargo Compt.<br>2.70 m. (9 ft.)          |
| B. 99A76101003000        | Pin-Rigging, Throttle Control Microswitch Unit                    |
| C. 98A27901005000        | Pin-Rigging, Cable Tension Regulator                              |
| D. 97A76102500002        | Quadrant - Graduated, Throttle and Thrust<br>Reverser Controls    |
| E. 35M5M01140001         | Test Set - Thrust Reverser Microswitch                            |
| F.                       | Circuit Breaker Safety Clips                                      |
| G.                       | Cotter Pins                                                       |
| H.                       | Corrosion - Resistant Steel Lockwire Dia.<br>0.032 in. (0.813mm). |
| J.                       | Blanking Plugs/Caps                                               |
| K.                       | Warning Notices                                                   |
| Referenced Procedures    |                                                                   |
| - 21-31-00, P. Block 501 | Cabin Pressure Control and Monitoring                             |
| - 22-33-16, P. Block 401 | Throttle Position Detector                                        |
| - 24-41-00, P. Block 301 | AC External Power Control                                         |
| - 27-61-00, P. Block 501 | Electrical and Mechanical Control (Spoilers<br>and Speed Brakes)  |

## 2. Procedure

R \*\*ON A/C 001-100,

### A. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

| PANEL | SERVICE                     | IDENT. | LOCATION |
|-------|-----------------------------|--------|----------|
| 21VU  | AFS/TCC/SYS1/28VDC          | 306CJ1 | 102/H 8  |
| 21VU  | AFS/TCC/SYS1/115VAC         | 308CJ1 | 102/H 9  |
| 21VU  | AFS/TCC/SENSORS             | 305CJ1 | 102/H10  |
| 21VU  | AFS/TCC/SYS2/115VAC         | 308CJ2 | 102/H11  |
| 21VU  | AFS/TCC/SYS2/28VDC          | 306CJ2 | 102/H12  |
| 133VU | ENG/ENG1/REV/CTL            | 1KM    | 332/V69  |
| 133VU | ENG/ENG2/REV/CTL            | 2KM    | 331/V74  |
| 133VU | ENG/ENG1&2/IGNITION/SYSA    | 1JH    | 334/S72  |
| 133VU | ENG/ENG1&2/IGNITION/SYS B   | 2JH    | 333/T72  |
| 133VU | ENG/ENG1&2/START CTL & WARN | 1KG    | 335/R68  |

(2)Position access platform at FWD cargo compartment door.

(3)Open access door 121BL.

(4)On cable tension regulator corresponding to microswitch unit to be removed, install rigging pin 98A27901005000.

(5)Install warning notice prohibiting throttle lever operation, on panels 429VU and 9VU.

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**B. Removal (Ref. Fig. 401)**

- (1) Disconnect electrical connector (2) and (3) from microswitch unit (1) and cap electrical connector.
- (2) Remove and discard cotter pin (16), remove nut (17), washer (18), bolt (19) and disengage rear end of link rod.
- (3) Remove and discard cotter pins (7), (12), (9) and (23).
- (4) Remove nuts (4), (8), (13) and (24), washer (5), (10), (14) and (22), bolts (6), (11), (15) and (21).
- (5) Remove and discard cotter pin (30), remove nut (29), washer (28) and bolt (27).
- (6) Disengage link-rod (20) from the yoke of microswitch unit input bellcrank.
- (7) Check attach fittings and linkage for correct condition and security of attachment and make certain that they are free from traces of wear or corrosion.

**C. Preparation of Replacement Component**

- (1) Make certain that replacement component is clean and free from corrosion or cracks.
- (2) Clean mounting area and check attach fittings for corrosion or cracks.

**D. Installation (Ref. Fig. 401)**

- (1) Engage end of rod (20) in microswitch unit yoke input bellcrank.
- (2) Install bolt (27), washer (28) and nut (29). Tighten and safety with new cotter pin (30).
- (3) Attach microswitch unit using bolts (6), (11), (15) and (21), washers (5), (10), (14) and (22), nuts (4), (8), (13) and (24), safety with new cotter pins (7), (9), (12) and (23).
- (4) Engage end of rod (20) in link rod, install bolt (19), washer (18) and nut (17). Tighten and safety with new cotter pin (16).
- (5) Connect electrical connectors (3) and (2) to microswitch unit (1).

**E. Adjustment (Ref. Fig. 401)**

- (1) Make certain throttle control levers are immobilized in IDLE position.
- (2) Make certain that rigging pin 99A76101003000 can be installed in microswitch unit. If not, proceed as follows :  
**NOTE** : To insert pin, move the opposite throttle control lever forward, at approximately 25°.
  - (a) Cut and remove lockwire (26) from both ends of link rod (20).
  - (b) Loosen lock-nut (25) and separate serrated washers at both ends of link rod (20).
  - (c) Turn body of link rod (20) until rigging pin 99A76101003000 fits correctly.
  - (d) Check that rigging remains correct after tightening lock-nuts (25).
  - (e) Through the witness hole, check that the threaded ends engage correctly in link rod (20).

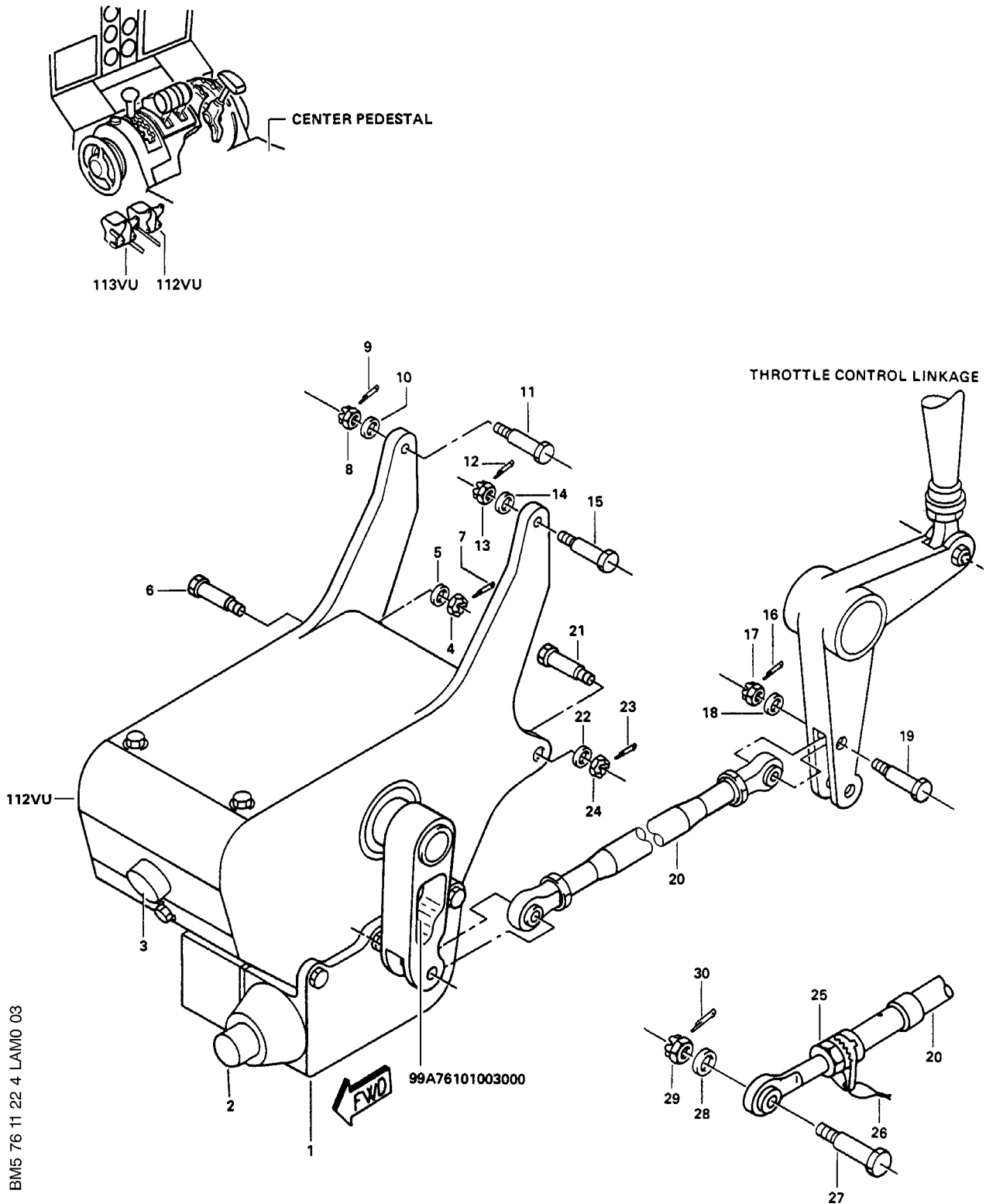
**F. Throttle Position Detectors 313CJ and 314CJ-Removal/Installation and Adjustment/Test**  
(Ref. 22-33-16, P. Block 401)

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Throttle Control Microswitch Unit  
Figure 401

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**NOTE** : This procedure is mandatory after all removals and replacements of either the complete Throttle Control Microswitch Unit (including Throttle Position Detector), or the separate Throttle Position Detector. Often the complete combined assembly is out of rig at either end, therefore both sides must be rigged per this procedure.

- G. Test (Ref. Fig. 402)
- (1)Initial conditions
- (a)Remove rigging pins 99A76101003000 and 98A27901005000.
- (b)Remove safety clips and tags and close circuit breakers 1KM, 2KM, 305CJ1, 306CJ1, 306CJ2, 308CJ1, 308CJ2, 1KG, 1JH, 2JH
- (c)Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
- (d)Make certain that electronics racks ventilation is correct.
- (e)Install tools 97A76102500002 and 35M5M01140001.
- (2)Procedure

| ACTION                                                                                                                                           | RESULT                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Advance throttle control levers to 10° position                                                                                               | - Check that spoilers can be extended (Ref. 27-61-00, P. Block 501)                                                                                                                                      |
| 2. Advance ENG1 throttle control lever to 22° position                                                                                           | - Check that cabin pre-pressurization operates correctly (normal take-off phase) (Ref. 21-31-00, P. Block 501)                                                                                           |
| - Repeat the operation with ENG2 throttle control lever                                                                                          |                                                                                                                                                                                                          |
| 3. Retard throttle control levers at a value lower than 22°                                                                                      | - Check that cabin depressurizes (normal landing phase) (Ref. 21-31-00, P. Block 501)                                                                                                                    |
| 4. Disconnect connectors 577VC from 113VU and 578VC from 112VU. Connect Test Set 35M5M01140001 to both microswitch units as identified on cable. |                                                                                                                                                                                                          |
| 5. On test set :                                                                                                                                 |                                                                                                                                                                                                          |
| - place ON/OFF switch in ON position                                                                                                             |                                                                                                                                                                                                          |
| - push LIGHT TEST pushbutton                                                                                                                     |                                                                                                                                                                                                          |
| - check the eight lights come on.                                                                                                                |                                                                                                                                                                                                          |
| 6. Place both throttle control levers in FIT position                                                                                            | - Check that lights on test set 35M5M01140001 indicate the OPEN position (lights on) for microswitches 7KM and 8KM and do not indicate the CLOSED position (lights off) for microswitches 13KM and 14KM. |

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| ACTION                                                                                                                                                                                                                                                       | RESULT                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>7. Actuate both thrust reverser control levers.</p> <ul style="list-style-type: none"> <li>- At RIT (before 41° of thrust reverser control levers).</li> <li>- In stow position (between 28°30' and 20°30' of thrust reverser control levers).</li> </ul> | <p>- Check that lights :</p> <ul style="list-style-type: none"> <li>. Indicate CLOSED position for microswitches 13KM and 14KM and then for microswitches 7KM and 8KM (Normal Sequence).</li> <li>. Do not indicate CLOSED position (lights off) for microswitches 13KM and 14KM and then indicate OPEN position (lights on) for microswitches 7KM and 8KM (Normal Sequence).</li> </ul> |

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## G. Test (Ref. Fig. 402)

### (1)Initial conditions

- (a)Remove rigging pins 99A76101003000 and 98A27901005000.
- (b)Remove safety clips and tags and close circuit breakers 1KM, 2KM, 305CJ1, 306CJ1, 306CJ2, 308CJ1, 308CJ2, 1KG, 1JH, 2JH
- (c)Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
- (d)Make certain that electronics racks ventilation is correct.
- (e)Install tools 97A76102500002 and 35M5M01140001.

### (2)Procedure

| ACTION                                                                  | RESULT                                                                                                         |
|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| 1. Advance throttle control levers to 10° position                      | - Check that spoilers can be extended (Ref. 27-61-00, P. Block 501)                                            |
| 2. Advance ENG1 throttle control lever to 22° position                  | - Check that cabin pre-pressurization operates correctly (normal take-off phase) (Ref. 21-31-00, P. Block 501) |
| - Repeat the operation with ENG2 throttle control lever                 |                                                                                                                |
| 3. Retard throttle control levers at a value lower than 22°             | - Check that cabin depressurizes (normal landing phase) (Ref. 21-31-00, P. Block 501)                          |
| 4. Disconnect connectors 577VC from 113VU and 578VC from 112VU. Connect |                                                                                                                |

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| ACTION                                                                                                                                                                                                     | RESULT                                                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Set 35M5M01140001 to both microswitch units as identified on cable.                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                      |
| 5. On test set :<br>- place ON/OFF switch in ON position<br>- push LIGHT TEST pushbutton<br>- check the eight lights come on.                                                                              |                                                                                                                                                                                                                                                                                                                                      |
| 6. Place both throttle control levers in FIT position                                                                                                                                                      | - Check that lights on test set 35M5M01140001 indicate the OPEN position (lights on) for microswitches 7KM and 8KM and do not indicate the CLOSED position (lights off) for microswitches 13KM and 14KM.                                                                                                                             |
| 7. Actuate both thrust reverser control levers.<br>- At RIT<br>(before 41° of thrust reverser control levers).<br><br>- In stow position<br>(between 28°30' and 20°30' of thrust reverser control levers). | - Check that lights :<br><br>. Indicate CLOSED position for microswitches 13KM and 14KM and then for microswitches 7KM and 8KM (Normal Sequence).<br><br>. Do not indicate CLOSED position (lights off) for microswitches 13KM and 14KM and then indicate OPEN position (lights on) for microswitches 7KM and 8KM (Normal Sequence). |

**\*\*ON A/C 001-100,**

## H. Close-Up

- (1) Safety lock-nut (25) at both ends of link rod (20) with 0.032 in. (0.813mm) corrosion-resistant steel lockwire (26).
- (2) Turn off equipment and remove electrical power.
- (3) Remove tools 97A76102500002 and 35M5M01140001 and connect 577VC and 578VC.
- (4) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
- (5) Carry out a complete cycle of the throttle control to make certain that there is no binding. Make certain that there is no friction at the microswitch unit.
- (6) Close access door 121BL.

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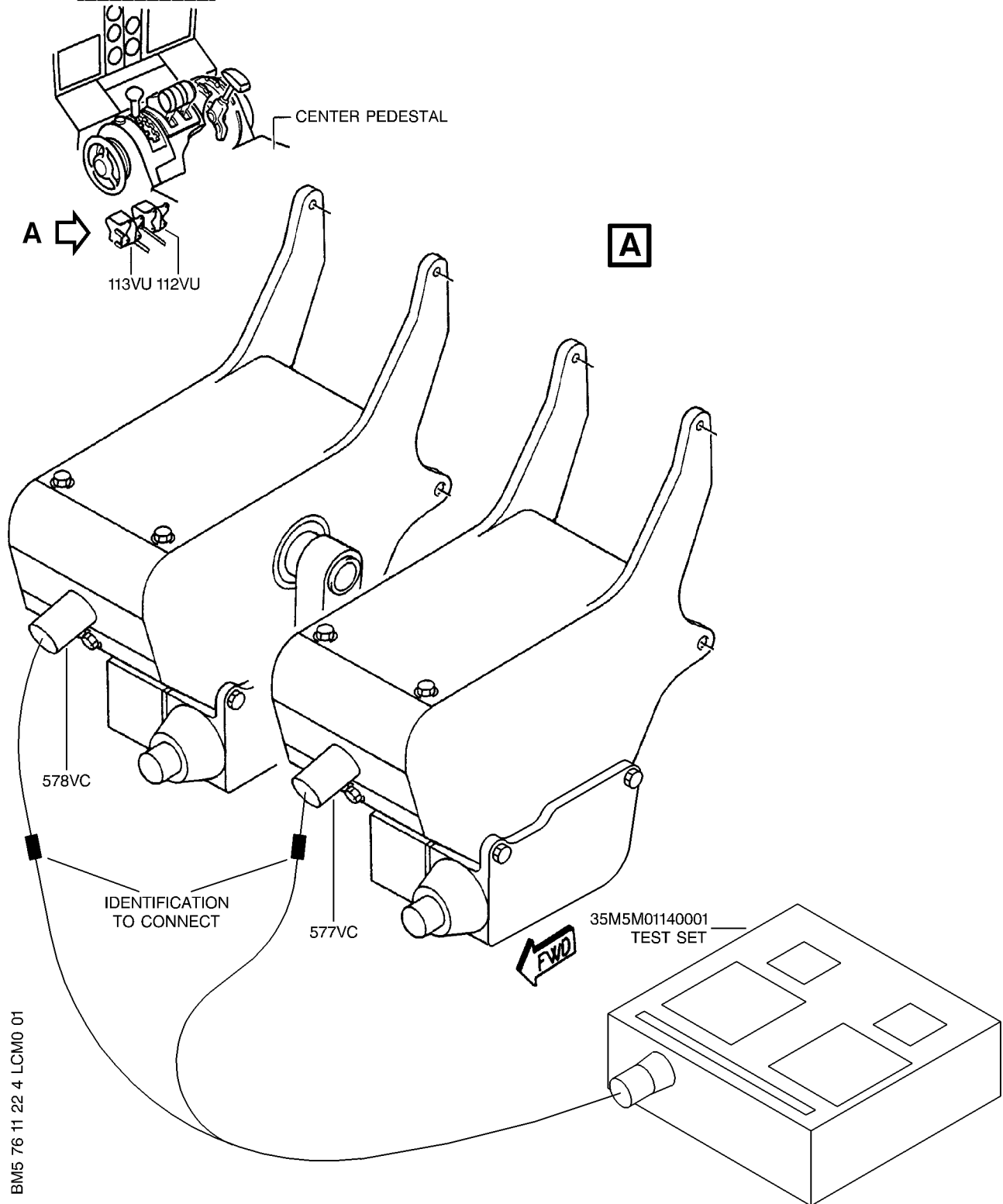
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Test Set - Thrust Reverser Microswitch  
Figure 402

R

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(7)Remove warning notices.

(8)Make certain that throttle control levers are in idle position.

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**H. Close-Up**

(1)Safety lock-nut (25) at both ends of link rod (20) with 0.032 in. (0.813mm) corrosion-resistant steel lockwire (26).

(2)Turn off equipment and remove electrical power.

(3)Remove tools 97A76102500002 and 35M5M01140001 and connect 577VC and 578VC.

(4)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(5)Carry out a complete cycle of the throttle control to make certain that there is no binding. Make certain that there is no friction at the microswitch unit.

(6)Close access door 121BL.

(7)Remove warning notices.

(8)Make certain that throttle control levers are in idle position.

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### LH AND RH CABLE TENSION REGULATOR - REMOVAL/INSTALLATION

**CAUTION :** BEFORE ATTEMPTING REMOVAL/INSTALLATION PROCEDURES FOR CABLE TENSION REGULATOR, MAKE CERTAIN THROTTLE CONTROL LEVERS ARE IMMOBILIZED IN "IDLE" POSITION. AS A SAFETY PRECAUTION, DISPLAY A WARNING NOTICE ON THE LEVERS AND ON ENGINE START PANEL 429VU.

RIGGING PINS WILL BE FITTED TO MICROSWITCH UNIT AND AUTOTHROTTLE COUPLING UNIT:

**NOTE :** Removal/Installation procedures are identical for both LH and RH cable tension regulators.

#### 1. Equipment and Materials

| ITEM                                             | DESIGNATION                                                              |
|--------------------------------------------------|--------------------------------------------------------------------------|
| A.                                               | Access Platforms                                                         |
| B. 99A76101003000                                | Pin-Rigging, Throttle Control Microswitch Unit                           |
| C. 98A76101003000                                | Pin-Rigging, Autothrottle Coupling Unit                                  |
| D. 98A27901005000                                | Pin-Rigging, Cable Tension Regulator                                     |
| E. 98A76103000000                                | Bar - Locking, Throttle Control, Cable Tension Regulator In "0" Position |
| F.                                               | Ambient Temperature Thermometer                                          |
| G.                                               | Circuit Breaker Safety Clips                                             |
| H.                                               | Safety Clips - Turnbuckles                                               |
| I. Material No. 08-002                           | Bonding and Adhesive Compounds (Ref. 20-31-00)                           |
| J.                                               | Warning Notice                                                           |
| Referenced Procedure<br>- 76-11-00, P. Block 501 | Throttle Controls                                                        |

#### 2. Procedure

##### A. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

| PANEL | SERVICE                        | IDENT.  | LOCATION |
|-------|--------------------------------|---------|----------|
| 21VU  | AFS/TCC/SYS 1/28VDC            | 306/CJ1 | 102/H 8  |
| 21VU  | AFS/TCC/SYS 1/115VAC           | 308/CJ1 | 102/H 9  |
| 21VU  | AFS/TCC/SENSORS                | 305/CJ1 | 102/H10  |
| 21VU  | AFS/TCC/SYS 2/115VAC           | 308/CJ2 | 102/H11  |
| 21VU  | AFS/TCC/SYS 2/28VDC            | 306/CJ2 | 102/H12  |
| 133VU | ENG/ENG 1 & 2/IGNITION/SYS A   | 1JH     | 334/S72  |
| 133VU | ENG/ENG 1 & 2/IGNITION/SYS B   | 2JH     | 333/T72  |
| 133VU | ENG/ENG 1 & 2/START CTL & WARN | 1KG     | 335/R68  |
| 133VU | ENG/ENG 1/REV/CTL              | 1KM     | 332/U69  |
| 133VU | ENG/ENG 2/REV/CTL              | 2KM     | 331/V74  |

(2)Position access platform at FWD cargo compartment door. Open FWD cargo compartment door then doors 131SW (132SW) giving access to avionics compartment.

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- (3) On panel 429VU
  - install a warning notice prohibiting throttle control lever operation.
- (4) Check that rigging pin 99A76101003000 can be installed in microswitch unit (Ref. 76-11-00, P. Block 501).
- (5) Install rigging pin 98A76101003000 in pulley of autotrottle coupling unit.
- (6) Remove safety clips (1) from turnbuckles (2) (Ref. Fig. 401)
- (7) Gradually loosen barrels of turnbuckles (2) until locking bar 98A76103000000 can be installed and rigging pin 98A27901005000 can be inserted on cable tension regulator.

### B. Removal (Ref. Fig. 401, 402)

- (1) Remove and discard cotter pin, remove nut (1) and washer (2). Remove bolt (3) and disengage rod (4) from regulator control bellcrank. (Ref. Fig. 402)

**NOTE** : To avoid damage, temporarily support rod (4) on a fixed component in adjacent area.

- (2) Remove and discard cotter pin, remove nut (5) and washer (6). Remove pin (8) and disengage rod (7) from regulator.

**NOTE** : To avoid damage, temporarily support rod (7) on a fixed component in adjacent area.

- (3) Remove and discard cotter pins, remove nuts (9), (14) and (19) and washers (10), (15), (20). Remove bolts (11), (16), (21), remove and retain spacers (13), (17), (22), (12), (18), (23). Remove fairlead (24).

- (4) Remove four bolts (48), washers (51) remove and retain stirrups (50) and spacer (49). Remove casing (31) and (32).

**NOTE** : As casings are similar, only one removal is dealt with.

- (5) Remove and discard cotter pins, remove nuts (25) and (28), remove washers (26) and (29), bolts (27) and (30), fairlead (33), remove and retain spacers (44), (45), (46) and (47).
- (6) Loosen barrels of turnbuckles (2) until it is possible to free cable ends from their recesses in regulator quadrants.
- (7) Remove and discard cotter pins, remove nut (34) on rear fitting and (36), (38) on front fitting. Remove washers (35), (37) and (39).
- (8) Support cable tension regulator and remove bolts (41) and (42) from front fitting and (40) from rear fitting. Remove and retain adjusting washers (43) and remove regulator.

### C. Preparation of Replacement Component (Ref. Fig. 403)

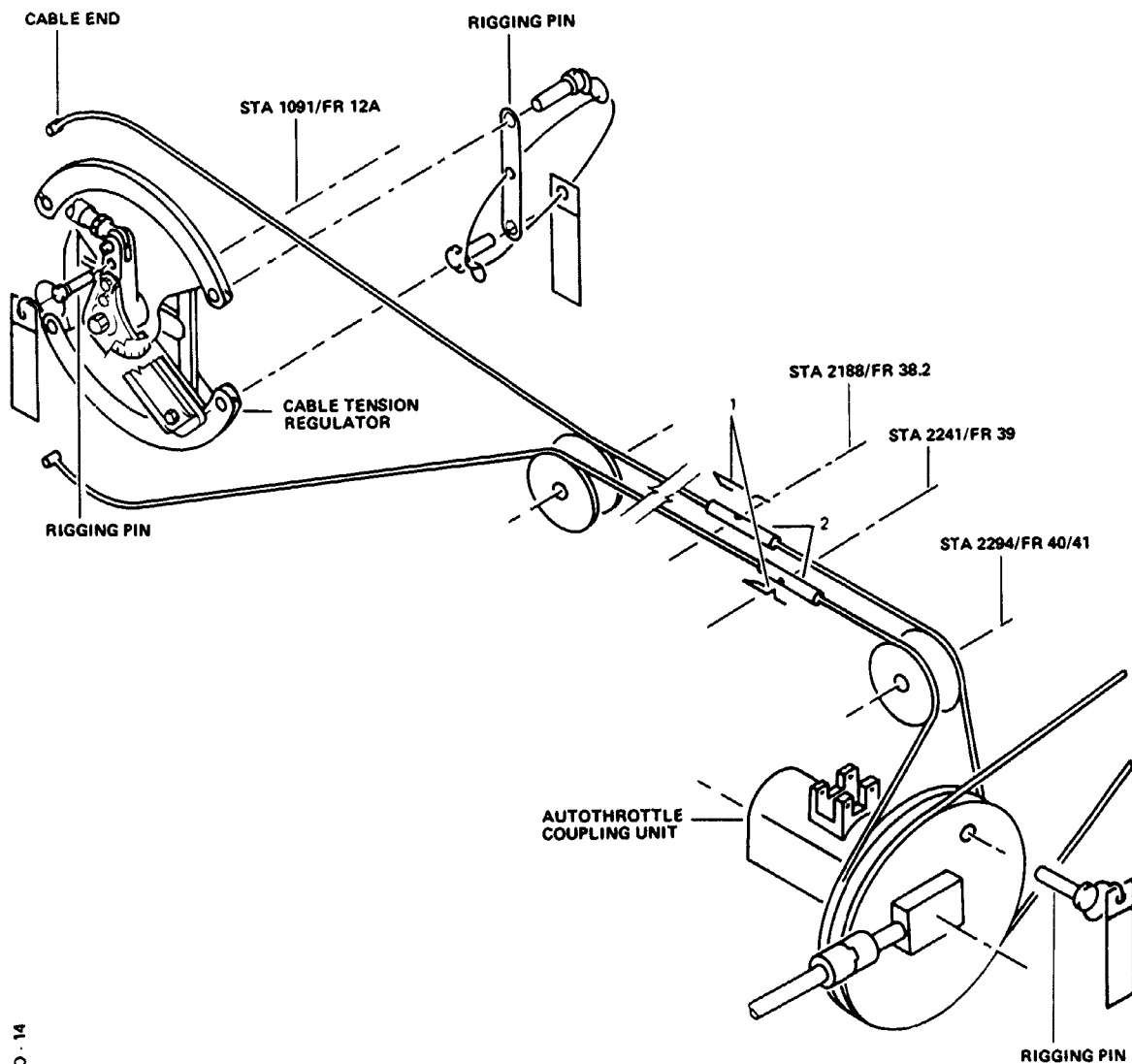
- (1) Make certain that replacement components is clean and free from corrosion or cracks.
- (2) Clean mounting area and check attach fittings for corrosion or cracks.
- (3) Disassembly of cable tension regulator
  - (a) Remove and discard cotter pin, remove nut (1), remove washers (2) and (4), remove bellcrank (3), remove bolt (5) from regulator hub.
  - (b) Remove and discard cotter pins, remove four nuts (8) and nut (9). Remove four washers (7) and (10) remove four bolts (6), remove bolt (11) and washer (12), remove flange (16) and shackle (13) with spacer (14).
  - (c) Remove regulator (17) from flange (15).

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BM5 76 11 23 4 LANO - 14

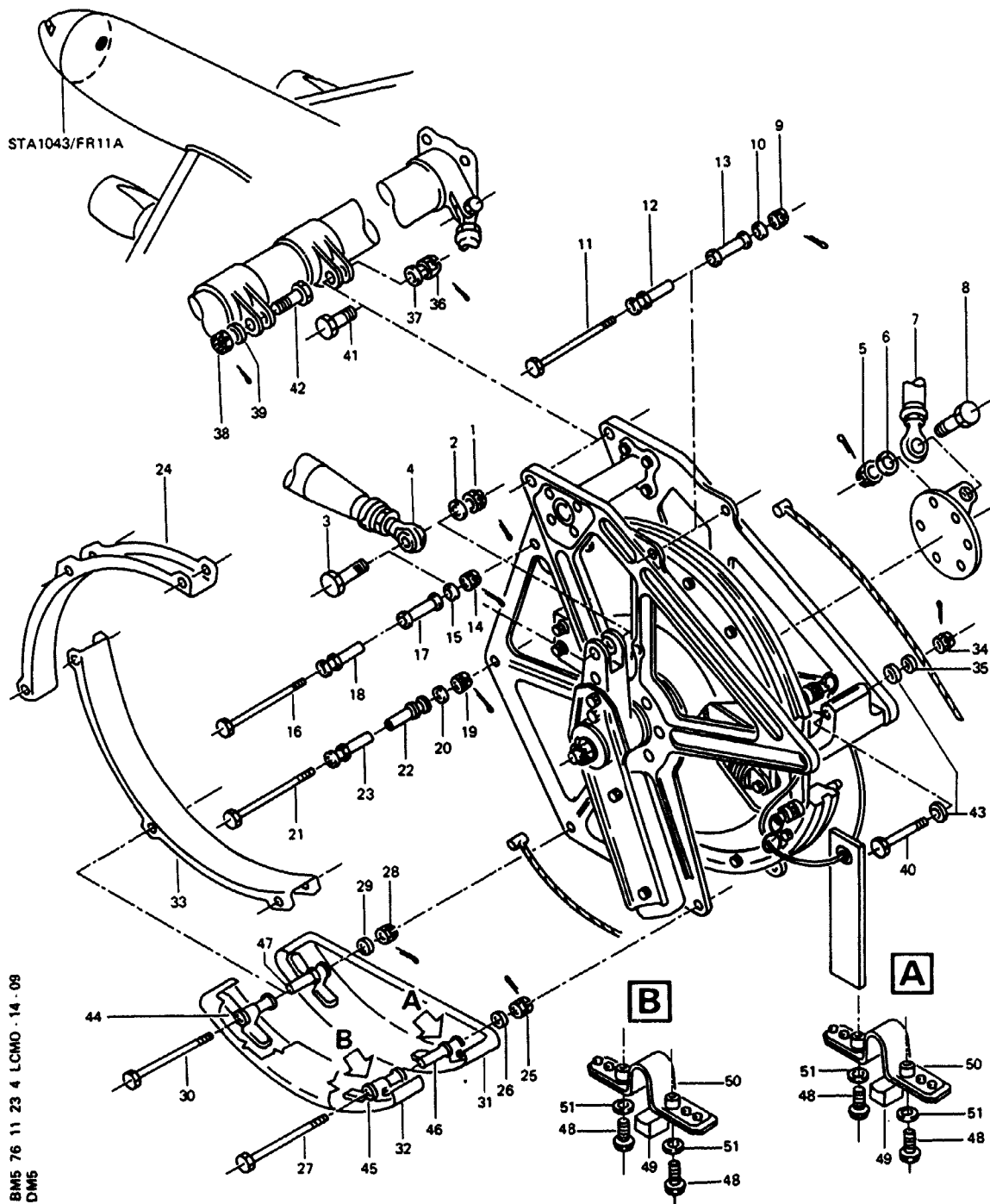
Cable Control in Fuselage  
Figure 401

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BMS 76 11 23 4 LCMO - 14 - 08  
DMS

Cable Tension Regulator  
Figure 402

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(4) Installation of the replacement regulator.

**WARNING** : LOCKING BAR ITEM 98A76103000000 MUST BE IMPERATIVELY INSTALLED ON REPLACEMENT CABLE TENSION REGULATOR.

- (a) Engage plain end of regulator hub into the bearing of flange (16). Engage bolt (5) into regulator hub (17).
- (b) Position shackle (13) equipped with spacer (14) on flange (16).
- (c) Center flange (15) on regulator hub (17). Engage the shoulder of spacer riveted to flange (15) in its hole in flange (16), install bolt (11) and washer (12) through shackle.
- (d) Install four washers (7), (10) install four bolts (6). Tighten four nuts (8) and (9) and safety with new cotter pins.
- (e) Engage adjusting washer (4) on regulator hub.
- (f) Engage bellcrank (3) on splined section checking its position with respect to the regulator. Engage washer (2), tighten nut (1) and safety with new cotter pin.
- (g) Bring regulator in position for installation. Support regulator, inserting pin 98A27901005000 in control bellcrank.

### D. Installation (Ref. Fig. 401, 402)

- (1) Place cable tension regulator in installation position and install bolts (41) and (42) on front fitting and bolt (40) with adjusting washers (43) on rear fitting.
- (2) On front fitting, engage washers (37) and (39), tighten nuts (36) and (38) and safety with new cotter pins.
- (3) On rear fitting, install washer (35), tighten nut (34), safety with new cotter pin.
- (4) Engage end fitting of rod (7) in regulator attachment yoke, install bolt (8), washer (6). Tighten nut (5), safety with new cotter pin.
- (5) Engage each cable end in its respective recess in cable quadrants.
- WARNING** : MAKE CERTAIN THAT CABLES ARE NOT CROSSED.
- (6) Install spacers (44), (45), (46) and (47).
- (7) Install casing (31) and (32), install stirrups (50) and spacers (49). Install four washers (51) and screws (48) with Material No. 08-002. Tighten screw (48).

**NOTE** : As casings are similar only one installation is described.

- (8) Install fairlead (33), bolts (30) and (27). Install washers (26) and (29), tighten nuts (25) and (28) and safety with new cotter pins.
- (9) Install spacers (13), (17), (22), (12), (18) and (23). Install fairlead (24). Install bolts (11), (16) and (21), washers (10), (15) and (20), nuts (9), (14) and (19) and safety with new cotter pins.
- (10) Engage end fitting of rod (4) in yoke of cable tension regulator input bellcrank. Install bolt (3), washer (2) and tighten nut (1). Safety with a new cotter pin.
- (11) Carry out all necessary adjustments and test (Ref. 76-11-00, P. Block 501).

### E. Close-Up

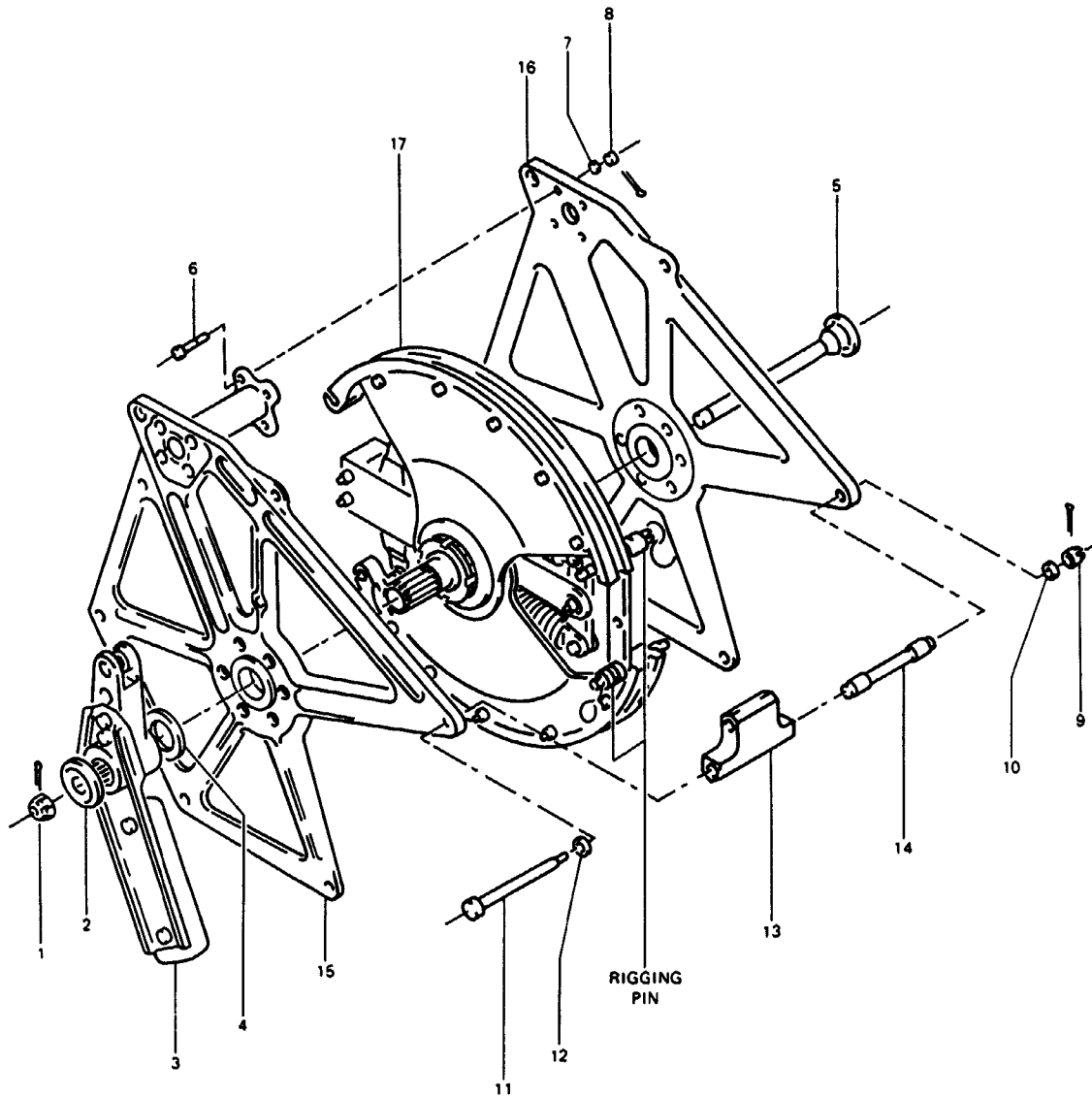
- (1) Safety turnbuckles (2) with new safety pins (1).
- (2) Remove rigging pins 99A76101003000, 98A76101003000, 98A27901005000 and 98A76103000000.
- (3) Make certain that working area is clean and clear of tools and

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DMS

Cable Tension Regulator  
Figure 403

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- miscellaneous items of equipment.
- (4) Install panel 131SW (132SW) in FWD cargo compartment.
  - (5) Remove warning notice.
  - (6) Remove safety clips and tags and close circuit breakers 306CJ1, 308CJ1, 305CJ1, 308CJ2, 306CJ2, 1JH, 2JH, 1KG, 1KM and 2KM.
  - (7) Remove access platforms.
  - (8) Make certain that throttle control levers are in idle position.

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## AIRCRAFT MAINTENANCE MANUAL

### THROTTLE CABLE TENSION REGULATOR - INSPECTION/CHECK

#### 1. Check of the Throttle Control Cables Tension

##### A. General

R The purpose of this procedure is to check the tension of throttle control cables in the fuselage and in the wing.

##### B. Equipment and Materials

| ITEM                     | DESIGNATION                      |
|--------------------------|----------------------------------|
| (1)                      | Access Platform                  |
| (2)                      | Warning Notice                   |
| (3)                      | Tensiometer                      |
| Referenced Procedure     |                                  |
| - 76-11-00, P. Block 501 | Throttle Controls                |
| - 76-11-23, P. Block 401 | Throttle Cable Tension Regulator |

##### C. Procedure

###### (1) Job Set-Up

(a) Position access platform at FWD cargo compartment door. Open FWD cargo compartment door then doors 131SW (132SW) giving access to avionics compartment.

(b) In flight compartment

R 1 Install a warning notice prohibiting operation of throttle control lever and flight controls.

###### (2) Cable Tension Regulator Check (Fuselage Section)

R (a) On cable tension regulator, make sure that pointer engraved on one of the quadrants is in front of the relevant compensation scale graduation determined against ambient temperature by means of the appropriate cable tension adjustment graph (Ref. Fig. 601, 602).  
R If adjustment is necessary, do the adjustment between cable  
R tension regulator and autothrottle coupling unit (Ref. 76-11-00,  
R P. Block 501).

R (b) Flex the same length of cable on both runs and release immediately.  
R During cable deflection, make sure that cable tension regulator  
R locking cross beam slides freely.  
R If it does not slide freely, replace the throttle control cable  
R tension regulator (Ref. 76-11-23, P. Block 401).

###### (3) Cable Tension Check (Wing Section)

R (a) Note ambient temperature. Check cable tension with tensiometer.  
R The correspondence between tension and temperature is indicated  
R in the reference graph (Ref. Fig. 603).

R (b) If cable tension is not within the acceptable limits, do the  
R adjustment between autothrottle coupling unit and primary  
R transmission relay (Ref. 76-11-00, P. Block 501).

###### (4) Close-Up

(a) Install panel 131SW (132SW) in FWD cargo compartment.

(b) Remove warning notice.

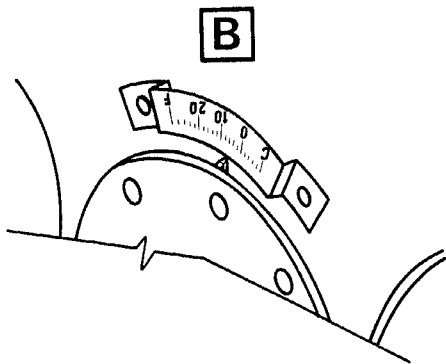
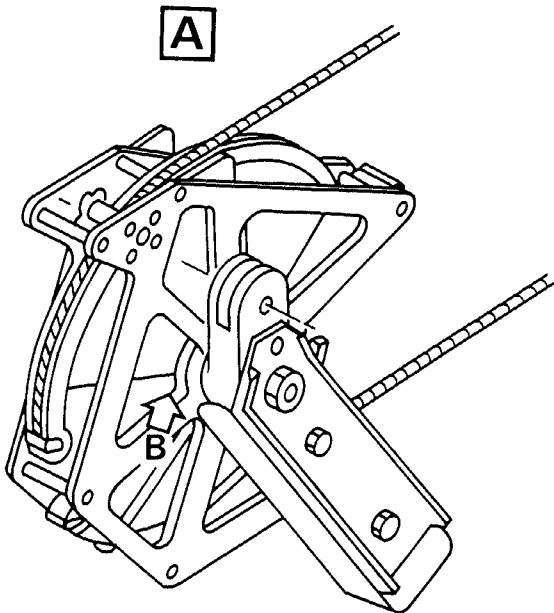
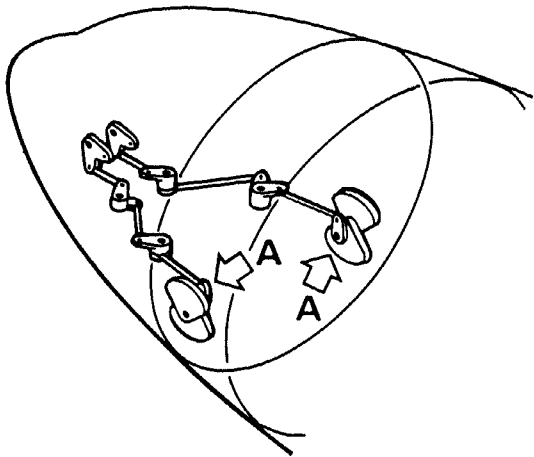
(c) Remove access platform.

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DM5

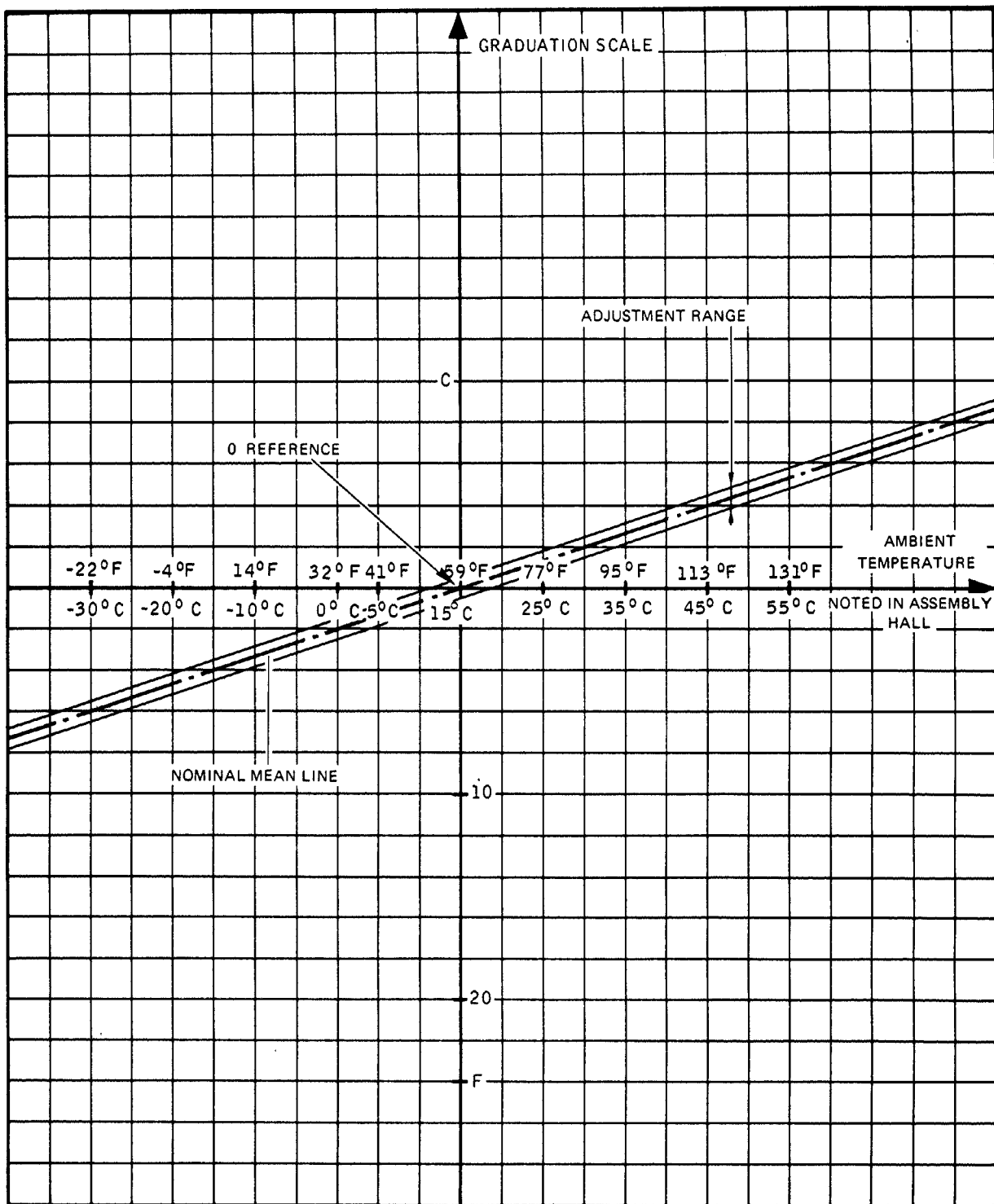
Cable Tension Regulators Compensation Scale  
Figure 601

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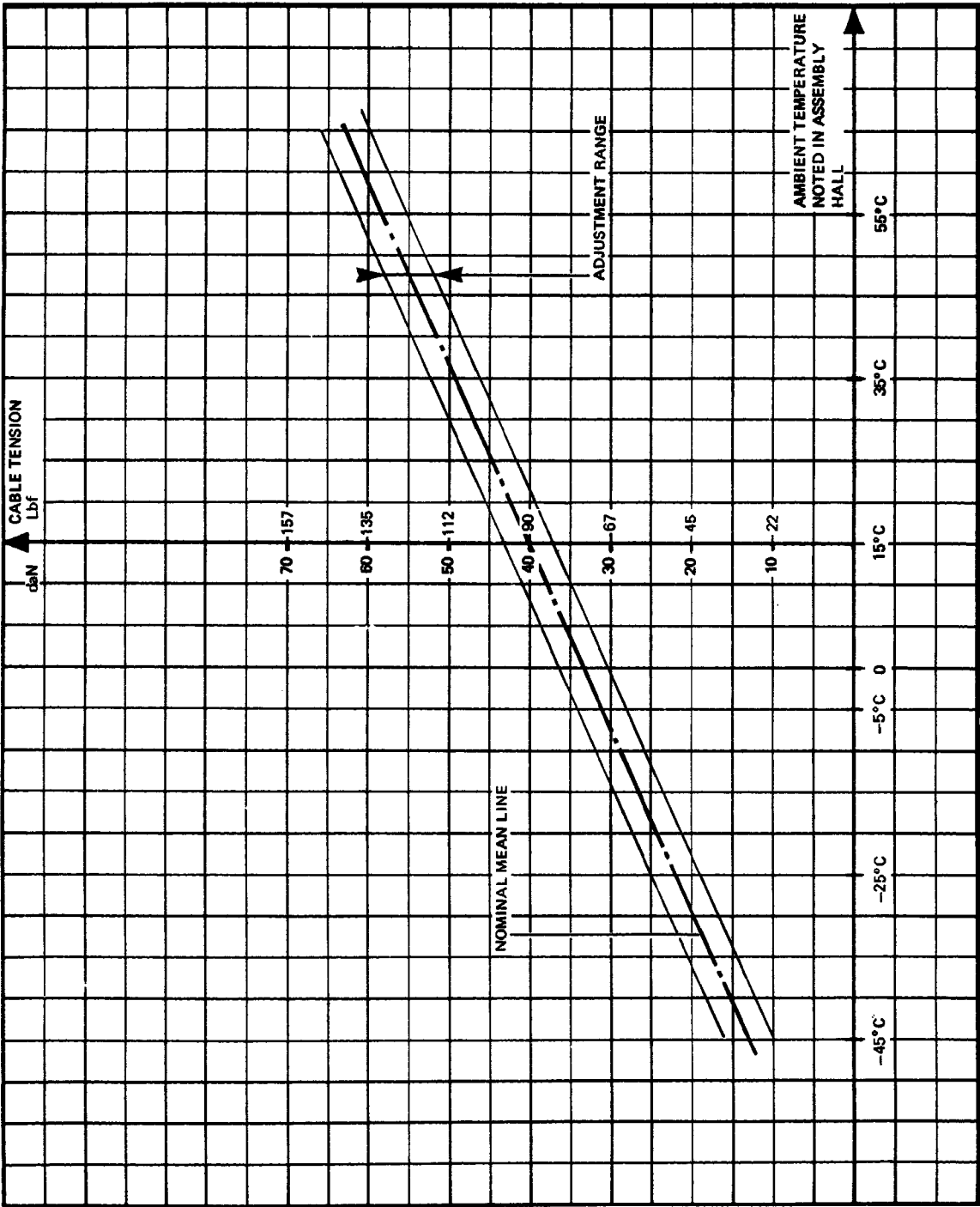
Fuselage Section - Cable Tension Adjustment Graph  
Figure 602

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Wing Section - Cable Tension Adjustment Graph  
Figure 603

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### 2. Inspection of the Tension Regulator Crank

**CAUTION** : DISPLAY A WARNING NOTICE ON THE LEVERS AND ON ENGINE START PANEL 429VU, NOT TO MOVE THE THROTTLE LEVERS AND START ENGINES.  
RIGGING PINS WILL BE FITTED TO MICROSWITCH UNIT AND AUTOTHROTTLE COUPLING UNIT.

**NOTE** : Removal/Installation procedures are identical for both LH and RH cable tension regulators.

#### A. Equipment and Materials

| ITEM                     | DESIGNATION                                     |
|--------------------------|-------------------------------------------------|
| (1)99A76101003000        | Pin-Rigging - Throttle Control Microswitch Unit |
| (2)98A76101003000        | Pin-Rigging, Autothrottle Coupling Unit         |
| (3)98A27901005000        | Pin-Rigging, Cable Tension Regulator            |
| (4)                      | Warning Notices                                 |
| Referenced Procedure     |                                                 |
| - 76-11-00, P. Block 501 | Throttle Controls                               |

#### B. Job Set-Up

- (1)In flight compartment, make certain that the throttle control levers are in idle position.
- (2)Display a warning notice on panel 429VU prohibiting starting of the engines
- (3)Display a warning notice on panel 9VU to prohibit any operation.
- (4)Open, safety and tag the following circuit breakers :

| PANEL | SERVICE                           | IDENT. | LOCATION |
|-------|-----------------------------------|--------|----------|
| 21VU  | AFS/TCC/SYS1/28VDC                | 306CJ1 | 102/H 8  |
| 21VU  | AFS/TCC/SYS1/115VAC               | 308CJ1 | 102/H 9  |
| 21VU  | AFS/TCC/SENSOR                    | 305CJ1 | 102/H10  |
| 21VU  | AFS/TCC/SYS2/115VAC               | 308CJ2 | 102/H11  |
| 21VU  | AFS/TCC/SYS2/28VDC                | 306CJ2 | 102/H12  |
| 133VU | ENGINES/ENG2/REVERSER/CTL         | 2KM    | 331/V74  |
| 133VU | ENGINES/ENG1/REVERSER/CTL         | 1KM    | 332/U69  |
| 133VU | ENGINES/ENG1 & 2/IGNITION/SYS B   | 2JH    | 333/T72  |
| 133VU | ENGINES/ENG1 & 2/IGNITION/SYS A   | 1JH    | 334/S72  |
| 133VU | ENGINES/ENG1 & 2/START/CTL & WARN | 1KG    | 335/R68  |

- (5)Get access to avionics compartment

#### C. Inspection (Ref. Fig. 604)

- (1)Install rigging pin 98A27901005000 in the regulator input crank.
- (2)Put a shim on the forward face of the crank in front of the rigging pin.
- (3)Check that the dimension "A" between the shim and the pin in position is approximately 7 mm.
- (4)If the dimension measured is approximately 12 mm, the installed crank is not correct. Replace this crank by a new crank.
- (5)Remove rigging pin 98A27901005000.

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**D. Replacement of Tension Regulator Crank (Ref. Fig. 605, 606)**

- (1) Open door 131AZ (132AZ) to get access to forward cargo compartment.
- (2) In forward cargo compartment, at STA2210, remove panel 131SW (132SW) for access to autothrottle coupling unit.
- (3) Install rigging pin 98A76101003000 in pulley of autothrottle coupling unit.
- (4) In avionics compartment, install rigging pin 99A76101003000 in microswitch unit.
- (5) Remove tension regulator crank.
  - (a) Remove and discard cotter pin, remove nut (4) and washer (3).
  - (b) Remove bolt (1) and disengage rod (2) from tension regulator crank.

**NOTE** : To avoid damage, temporarily support rod (2) on a suitable component in adjacent area.
  - (c) Remove and discard cotter pin, remove nut (9).
  - (d) Remove washer (8), crank (7) and keep pin (5) and washer (6) in tension regulator hub.
  - (e) Remove tension regulator crank (7) from cable tension regulator assembly.
- (6) Remove the mounting plate, including the balance weight, from the removed crank.
  - (a) Remove and discard cotter pins, remove the two nuts (14) and washers (13).
  - (b) Remove the two bolts (10), mounting plate (11) and shim (12) from crank (7). Discard the crank.
- (7) Install the mounting plate, including the balance weight, on a new crank.
  - (a) Install shim (12) and mounting plate (11) on crank (7) with two bolts (10).
  - (b) Install two washers (13) and nuts (14). Tighten the nuts. Safety with two new cotter pins.
- (8) Install the crank on cable tension regulator assembly.
  - (a) Check that pin (5) is engaged in regulator hub.
  - (b) Check that adjusting washer (6) is installed on regulator hub.
  - (c) Put crank in position on grooved shaft.

**NOTE** : The foolproofing device to install the crank in correct position consists of a missing tooth in boring of the crank and a larger tooth on grooved shaft.
  - (d) Install washer (8). **TORQUE** nut (9) to between 80 and 88.5 lbf.in. (0.9 and 1 m.daN). Safety with a new cotter pin.
  - (e) Adjust the length of adjustable rod (Ref. Fig. 605) so that it is possible to connect rod (2) to crank with rigging pin in microswitch unit sliding freely.
  - (f) Engage end of rod (2) in yoke of crank. Install bolt (1) and washer (3). Tighten nut (4) and safety with a new cotter pin.

**E. Test**

- (1) Install rigging pin 98A27901005000 in cable tension regulator.
- (2) Make certain that rigging pins slide freely.
- (3) If necessary, adjust again length of adjustable rod and adjust cable between cable tension regulator and autothrottle coupling unit (Ref. 76-11-00, P. Block 501).
- (4) Remove the rigging pins at microswitch unit, cable tension regulator

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- assembly and autothrottle coupling unit.
- (5) Perform several complete cycles of throttle control lever and check that there is no friction point or binding in complete throttle and thrust reverser control lever travel.
  - (6) Check alignment of throttle control levers (Ref. 76-11-00, P. Block 501).

**F. Close-Up**

- (1) Install panel 131SW (131SW).
- (2) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
- (3) Remove safety clips and tags and close circuit breakers 305CJ1, 306CJ1, 306CJ2, 308CJ1, 308CJ2, 1KG, 1KM, 2KM, 1JH and 2JH.
- (4) Remove warning notices from panels 9VU and 429VU.
- (5) Make certain that throttle control levers are in idle position.

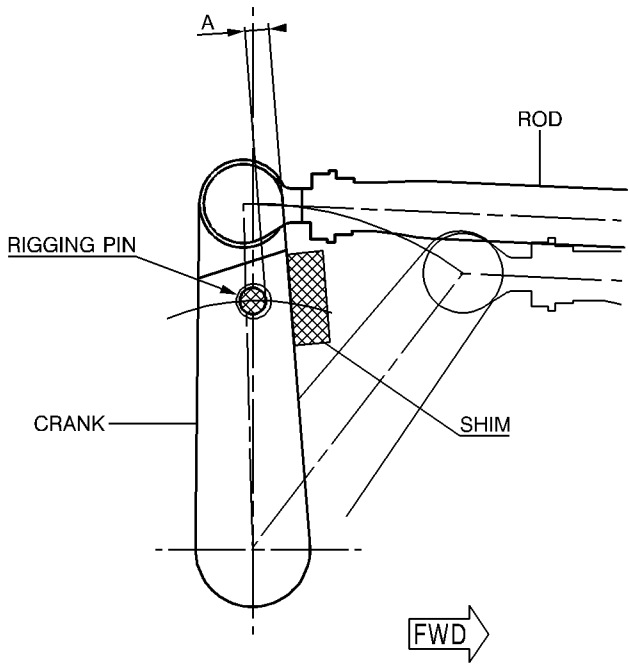
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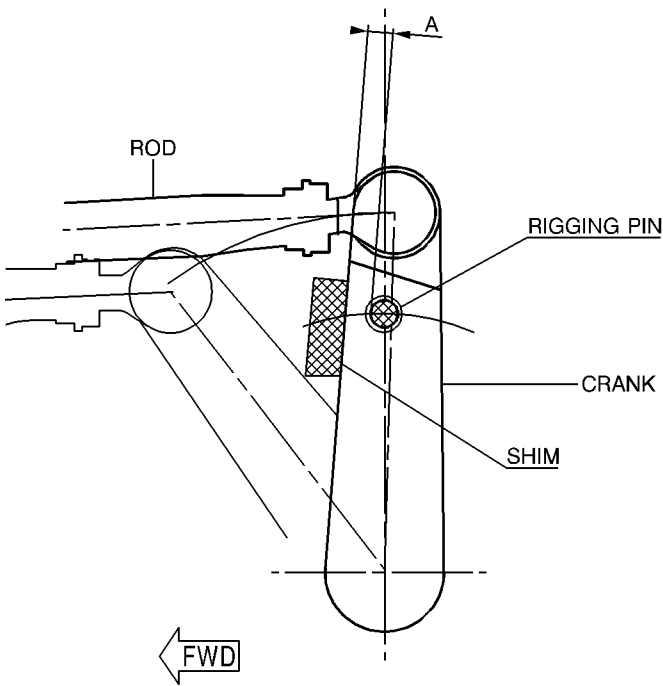
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LH TENSION REGULATOR CRANK (ENG 1)



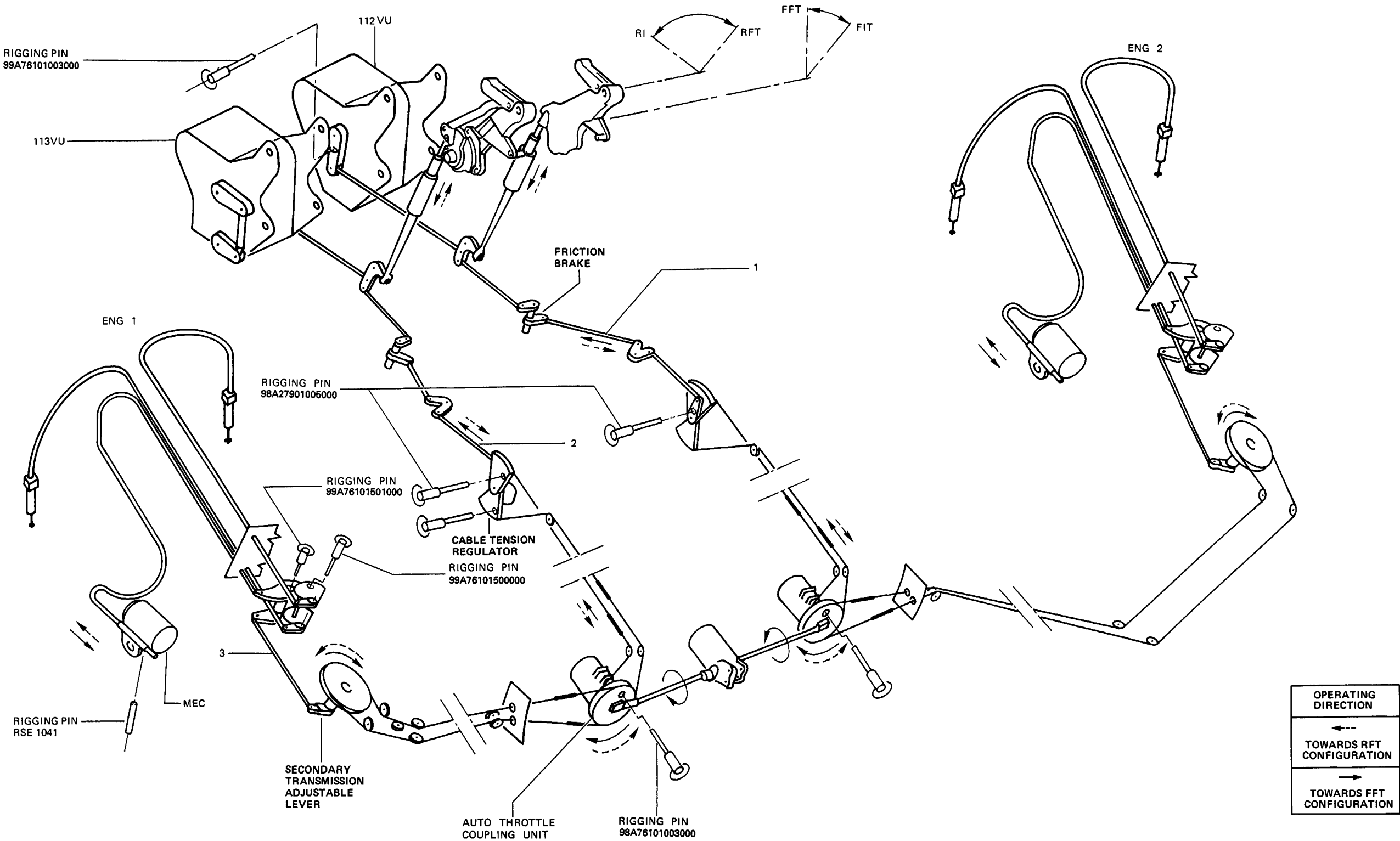
RH TENSION REGULATOR CRANK (ENG 2)



Tension Regulator Crank - Inspection

Figure 604

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Rigging Pin - Installation

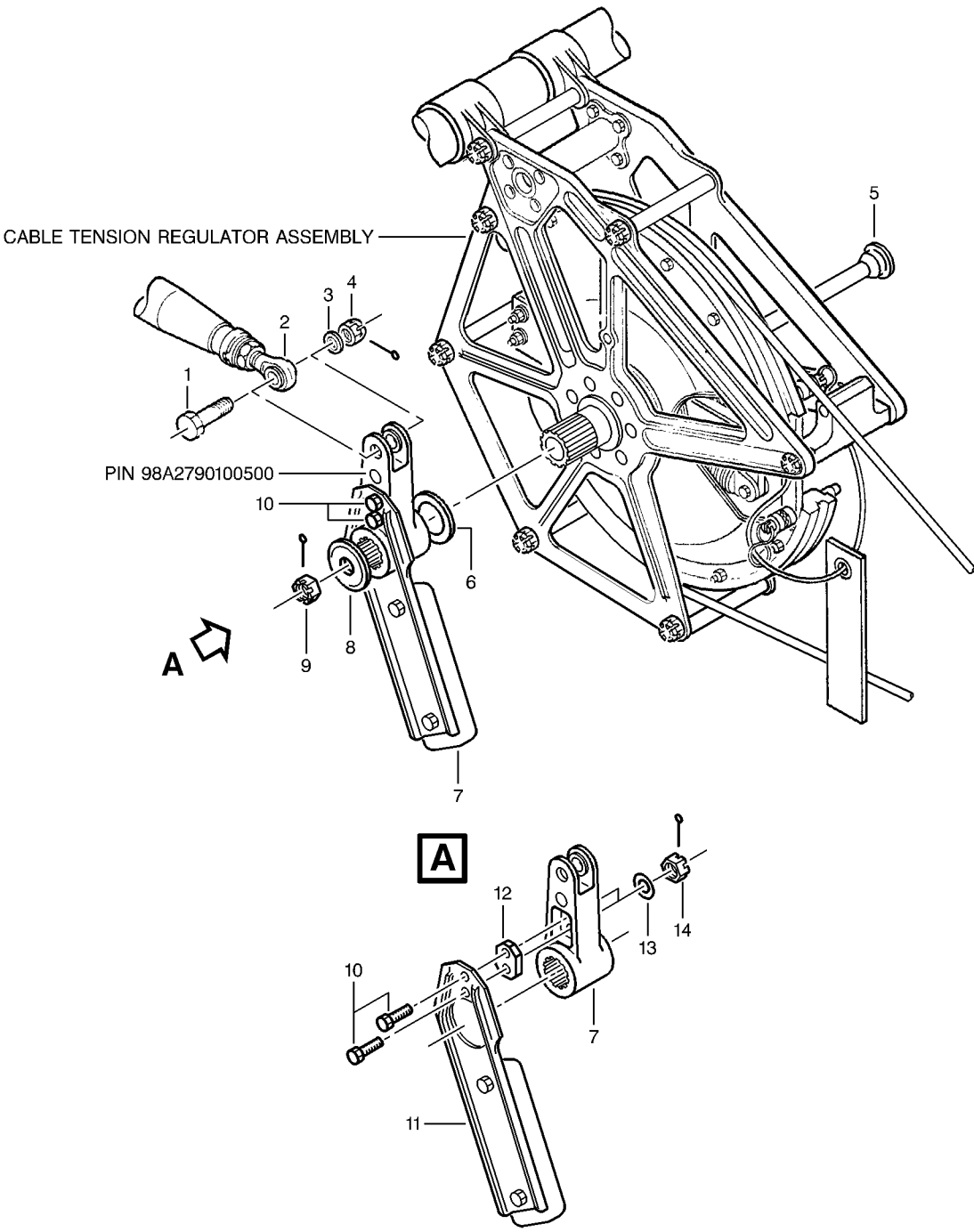
Figure 605

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Tension Regulator Crank - Replacement  
Figure 606

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## AIRCRAFT MAINTENANCE MANUAL

### PRESSURE SEALS (THROTTLE CONTROL) - REMOVAL/INSTALLATION

**CAUTION :** BEFORE ATTEMPTING REMOVAL/INSTALLATION PROCEDURES FOR PRESSURE SEALS, MAKE CERTAIN THROTTLE CONTROL LEVERS ARE IMMOBILIZED IN THE IDLE POSITION.

AS A SAFETY PRECAUTION, DISPLAY WARNING NOTICES ON THROTTLE CONTROL LEVERS, FLAP AND SLAT CONTROL LEVER AND ENGINE START PANEL 429VU TO PROHIBIT MANEUVERS.

RIGGING PINS WILL BE FITTED TO AUTOTHROTTLE COUPLING UNIT AND PRIMARY TRANSMISSION CRANK LEVER.

**NOTE :** Removal/Installation procedures for pressure seals are identical for both left and right sides.

#### 1. Equipment and Materials

| ITEM                                             | DESIGNATION                                                    |
|--------------------------------------------------|----------------------------------------------------------------|
| A.                                               | Access Platform                                                |
| B. 98A76101003000                                | Pin - Rigging, Autothrottle Coupling Unit                      |
| C. 99A76101501000                                | Pin - Rigging, Primary Transmission Crank Lever                |
| D.                                               | Thermometer - Ambient Temperature                              |
| E.                                               | Tensiometer                                                    |
| F.                                               | Circuit Breaker Safety Clips                                   |
| G.                                               | Corrosion - Resistant Steel Lockwire Dia. 0.032 in. (0.813 mm) |
| H.                                               | Torque Wrench 0.2 m.daN (18 lbf. in.)                          |
| I.                                               | Safety Clips - Turnbuckles                                     |
| J. Material No. 09-001                           | Sealants (Ref. 20-31-00)                                       |
| K. Material No. 11-003                           | Cleaning Agents (Ref. 20-31-00)                                |
| L.                                               | Lint Free Cloth                                                |
| M.                                               | Warning Notices                                                |
| Referenced Procedure<br>- 76-11-00, P. Block 501 | Throttle Controls                                              |

#### 2. Procedure

##### A. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

| PANEL | SERVICE                     | IDENT. | LOCATION |
|-------|-----------------------------|--------|----------|
| 21VU  | AFS/TCC/SYS 1/28VDC         | 306CJ1 | 102/H 8  |
| 21VU  | AFC/TCC/SYS 1/115VAC        | 308CJ1 | 102/H 9  |
| 21VU  | AFC/TCC/SENSORS             | 305CJ1 | 102/H10  |
| 21VU  | AFS/TCC/SYS 2/115VAC        | 308CJ2 | 102/H11  |
| 21VU  | AFS/TCC/SYS 2/28VDC         | 306CJ2 | 102/H12  |
| 133VU | ENG/ENG1&2/IGNITION/SYSA    | 1JH    | 334/S72  |
| 133VU | ENG/ENG1&2/IGNITION/SYSB    | 2JH    | 333/T72  |
| 133VU | ENG/ENG1&2/START CLT & WARN | 1KG    | 335/R68  |
| 133VU | ENG/ENG1/REV/CTL            | 1KM    | 332/U69  |
| 133VU | ENG/ENG2/REV/CTL            | 2KM    | 331/V74  |

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- (Ref. Fig. 401)
- (2) Position access platform at forward cargo compartment door and at engine pylon.
  - (3) On panels 429VU and 9VU
    - Display warning notices prohibiting operation of throttle control levers and flap and slat control lever.
  - (4) In forward cargo compartment, at STA2294 (FR40/41)
    - Remove panel 131SW (132SW) allowing access to pressure seals to be removed and to the relevant autothrottle coupling unit.
  - (5) On engine pylon :
    - Open access doors 414ER (424ER) allowing access to primary transmission crank lever.
  - (6) Check adjustment of throttle control linkage between control lever and autothrottle coupling unit (Ref. 76-11-00, P. Block 501).
  - (7) Install rigging pin 98A76101003000 in autothrottle coupling unit and rigging pin 99A76101501000 in primary transmission crank lever (FIT 52° PLA).

**B. Removal (Ref. Fig. 401, 402)**

- (1) Remove turnbuckle safety clips (1) from turnbuckle barrels (2). Loosen barrels and disconnect cable ends.
- (2) Remove circlip (1) and sleeve (2).
- (3) Cut and remove lockwire, remove screws (3) and (4).
- (4) Disengage pressure seal from bulkhead connection.
- (5) Separate flanges (5) and (6), retain locating bushes (7) and fairleads (8).
- (6) Repeat same steps for the other pressure seal.

**C. Preparation of Replacement Component**

- (1) By means of a non-metallic tool, remove all traces of sealant remaining on pressure seal bulkhead connection and flanges.
- (2) By means of a lint-free cloth soaked in Material No.11-003 clean pressure seal bulkhead connection and flanges. Allow to dry.

**D. Installation (Ref. Fig. 402)**

- (1) Pass the cable through flanges (6) and (5) and through sleeve (2).
- (2) Connect cable end to turnbuckles. Take up slack in cable runs.
- (3) Adjust tension of cable runs in wings (Ref. 76-11-00, P. Block 501).
- (4) Engage the two halves of fairlead (8) with flange (5).
- (5) Assemble the two flanges (5) and (6) and install locating bushes (7).
- (6) Coat mating surface of flange (6) with Material No.09-001.
- (7) Align pressure seal parallel to cable.
- (8) Install screws (3) and (4) together with washers and TORQUE to 0.2 m.daN (18 lb . in.)
- (9) Install sleeve (2) on fairlead (8) and install circlip (1).
- (10) Safety screws (3) and (4) with lockwire dia. 0.032 in. (0.813 mm).

**E. Test**

- (1) Remove rigging pin 98A76101003000 from autothrottle coupling unit. Remove rigging pin 99A76101501000 from primary transmission crank lever.
- (2) Remove warning notice from flap and slat control lever.

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- (3) Remove warning notice from throttle control levers, then proceed with several complete cycles of throttle control levers. Make certain there is no binding. Return the levers to idle position.
- (4) Make certain that rigging pins 98A76101003000 and 99A76101501000 slide freely in their rigging holes. If not, re.adjust cable until this result is achieved.
- (5) Perform operational test of throttle control linkage in fuselage (Ref. 76-11-00, P. Block 501).

**F. Close-Up**

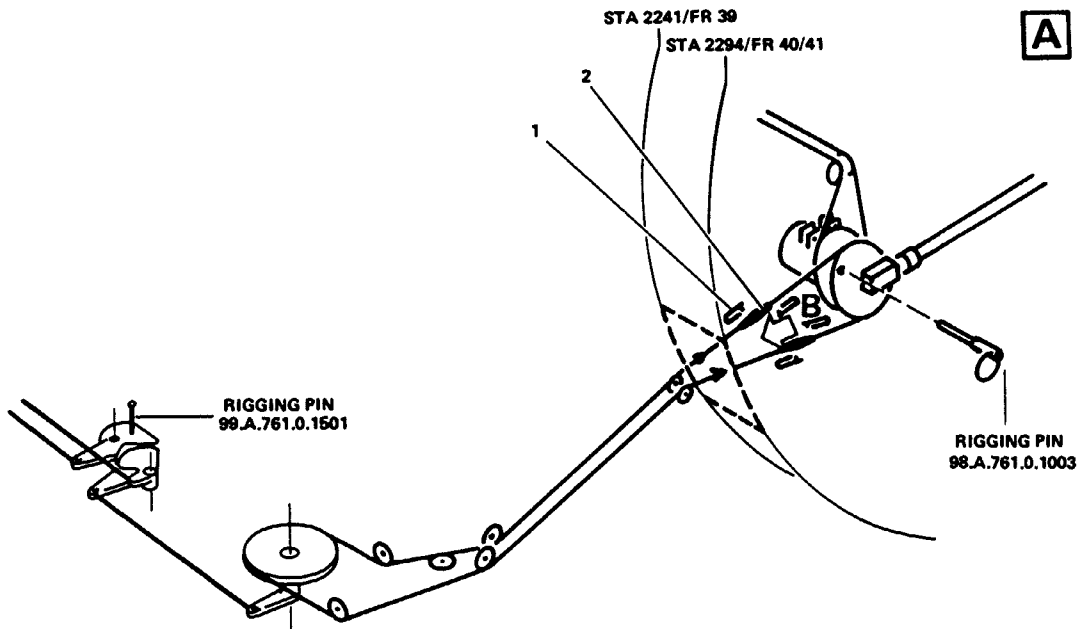
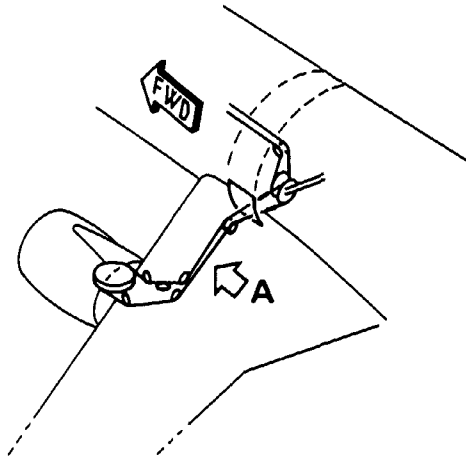
- (1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
- (2) Close access doors 414ER (424ER) on engine pylon and install panel 131SW (132SW).
- (3) Remove safety clips and tags and close circuit breakers 306CJ1, 308CJ1, 305CJ1, 308CJ2, 306CJ2, 1JH, 2JH, 1KG, 1KM and 2KM.
- (4) Remove access platforms.
- (5) Make certain that throttle control levers are in idle position.

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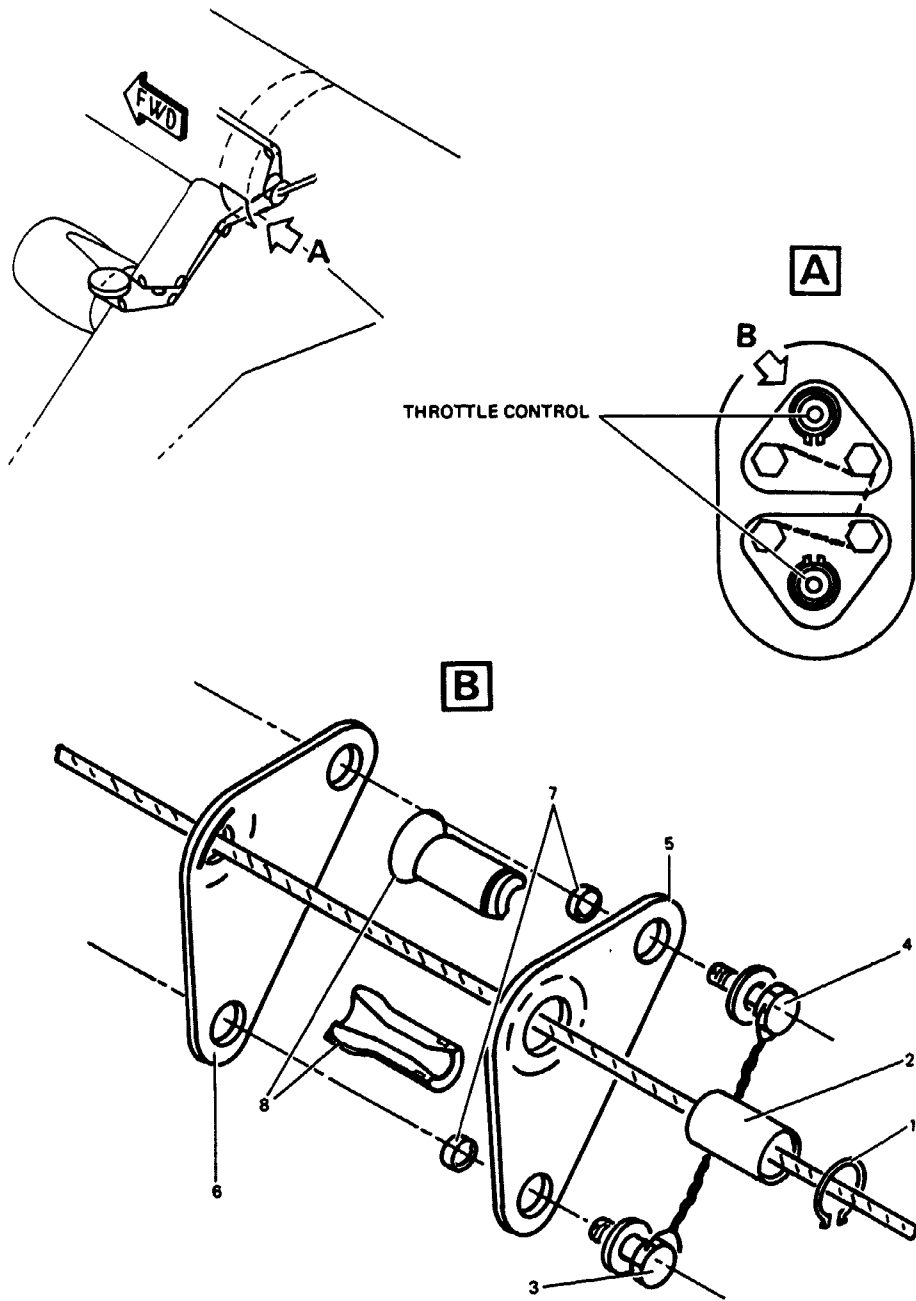
Throttle Control - Pressure Seal Location  
Figure 401

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Pressure Seals  
Figure 402

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## AIRCRAFT MAINTENANCE MANUAL

### SECONDARY TRANSMISSION - REMOVAL/INSTALLATION

**CAUTION :** BEFORE ATTEMPTING REMOVAL/INSTALLATION PROCEDURES FOR SECONDARY TRANSMISSION PULLEY, MAKE CERTAIN THROTTLE CONTROL LEVERS ARE IMMOBILIZED IN "IDLE" POSITION.

AS A SAFETY PRECAUTION, DISPLAY WARNING NOTICE ON FLAP CONTROL LEVER ON PANEL 429VU.

DISPLAY A WARNING NOTICE TO PROHIBIT USE OF THE GROUND HP AIR SUPPLY CONNECTIONS.

**NOTE :** Removal/Installation procedures for right and left secondary transmission pulleys are identical.

#### 1. Equipment and Materials

| ITEM                     | DESIGNATION                                       |
|--------------------------|---------------------------------------------------|
| A.                       | Access Platform                                   |
| B.                       | Circuit Breaker Safety Clips                      |
| C.                       | Corrosion Resistant Steel Lockwire                |
| D.                       | Cotter Pins                                       |
| E.                       | Lockwashers                                       |
| F.                       | Safety Clips - Turnbuckle                         |
| G.                       | Tensiometer                                       |
| H.                       | Warning Notices                                   |
| I. 98A76101003000        | Pin - Rigging, Autothrottle Coupling Unit         |
| J. 99A76101501000        | Pin - Rigging, Primary Transmission Crank Lever   |
| K.                       | Torque Wrench, 61 - 71 lbf. in. (0.7 - 0.8 m.daN) |
| Referenced Procedures    |                                                   |
| - 20-29-00, P. Block 1   | System Cabling                                    |
| - 36-11-00, P. Block 401 | Engine Bleed Air Supply System                    |
| - 76-11-00, P. Block 401 | Throttle Controls                                 |
| - 76-11-00, P. Block 501 | Throttle Controls                                 |

#### 2. Procedure

##### A. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

| PANEL | SERVICE                        | IDENT.  | LOCATION |
|-------|--------------------------------|---------|----------|
| 21VU  | AFS/TCC/SYS 1/28VDC            | 306/CJ1 | 102/H 8  |
| 21VU  | AFS/TCC/SYS 1/115VAC           | 308CJ1  | 102/H 9  |
| 21VU  | AFS/TCC/SENSORS                | 305CJ1  | 102/H10  |
| 21VU  | AFS/TCC/SYS 2/115VAC           | 308CJ2  | 102/H11  |
| 21VU  | AFS/TCC/SYS 2/28VDC            | 306CJ2  | 102/H12  |
| 133VU | ENG/ENG 1 & 2/IGNITION/SYS A   | 1JH     | 334/S72  |
| 133VU | ENG/ENG 1 & 2/IGNITION/SYS B   | 2JH     | 333/T72  |
| 133VU | ENG/ENG 1 & 2/START CTL & WARN | 1KG     | 335/R68  |
| 133VU | ENG/ENG 1/REVERSE/CTL          | 1KM     | 332/U69  |
| 133VU | ENG/ENG 2/REVERSE/CTL          | 2KM     | 331/Y74  |

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- (2) Position access platform at forward cargo compartment door and at engine pylon.
- (3) On panel 429VU and 9VU.
  - Display warning notices prohibiting operation of throttle control levers and flap and slat control lever.
- (4) In FWD cargo compartment, at STA2294 (FR40/41), remove panel 131SW (132SW) giving access to turnbuckles.
- (5) With throttle control levers in idle position, install autothrottle coupling unit rigging pin 98A76101003000.
- (6) On engine pylon, open access 471AL, 472AR, 415AL and 416AR (481AL, 482AR, 425AL and 426AR).
- (7) Remove bleed air duct at pylon/wing junction (Ref. 36-11-00, P. Block 401). Cap open ends of ducts on aircraft.
- (8) Install rigging pin 99A76101501000 on primary transmission crank lever assy.
- (9) Remove and discard cotter pin (9), remove nut (8), washer (7), bolt (6) and disengage rod (10) (Ref. Fig. 402) Detail C.
- (10) Remove safety clips (1), loosen two turnbuckles (2) in FWD cargo compartment (Ref. Fig. 401) Detail B.

**B. Removal (Ref. Fig. 401, 402)**

- (1) Remove nuts (1) and cover (2).
- (2) Cut and remove lockwire, remove two screws (18), washer (17) and cable stop (16).
- (3) Disengage cable (3) from pulley (Ref. Fig. 401) Detail A.
- (4) Remove bolt (12), remove and discard lockwasher (11), remove adjustable bellcrank (5).
- (5) Remove nuts (3), spacers (19) and equipped mounting base (14).

**C. Preparation of Replacement Component (Ref. Fig. 402)**

- (1) Make certain that replacement component is clean and free from corrosion or cracks.
- (2) Clean mounting area and check attach fittings for corrosion or cracks.
- (3) Before installation of adjustable bellcrank (5) check that theoretical length  $L = 78 \text{ mm (3.07 in.)} \pm 3 \text{ mm (0.11 in.)}$  (Ref. Fig. 402) Detail C.
- (4) If dimension is incorrect :
  - (a) Untighten the two bolts (4).
  - (b) Turn bolt (13) counterclockwise to reduce L, clockwise to increase L.
  - (c) Tighten the two bolts (4).

**D. Installation (Ref. Fig. 401, 402)**

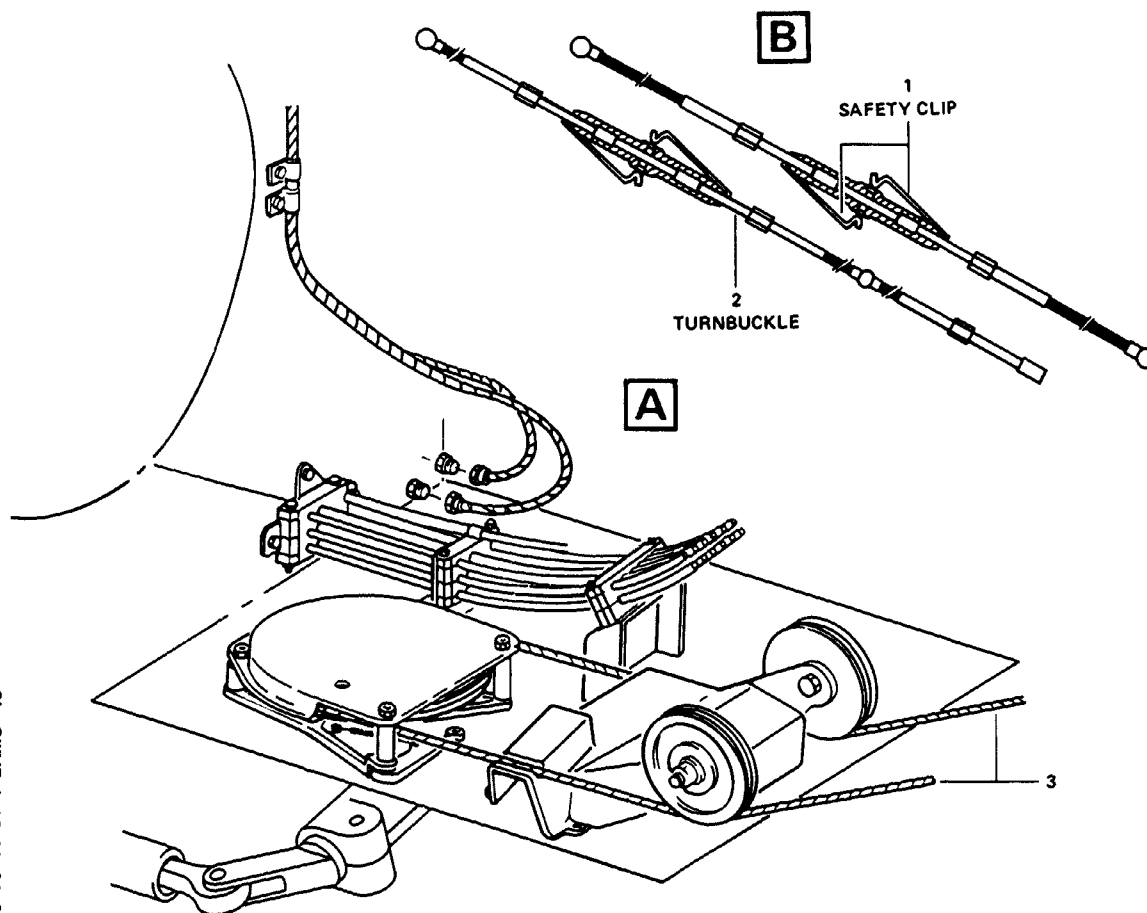
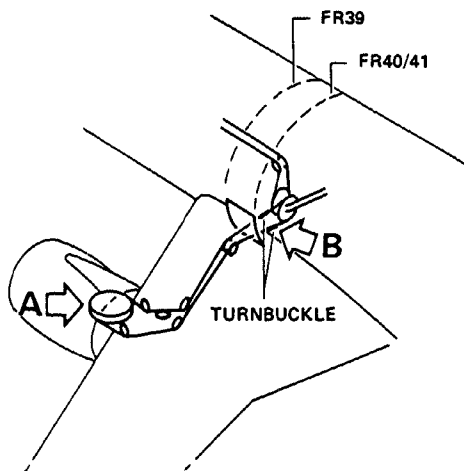
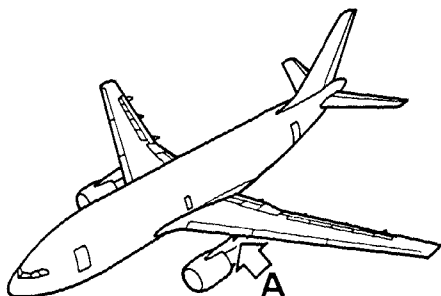
- (1) Install equipped mounting base (14), nuts (3) and spacers (19).
- (2) Install rod (10) in yoke of adjustable bellcrank (5) and secure with bolt (6), washer (7) and nut (8). Safety with new cotter pin (9).
- (3) Position pulley so that cam (15) is in forward idle throttle position (Ref. Fig. 402) Detail C.
- (4) Install adjustable bellcrank (5) on splined shaft, install new lockwasher (11), TORQUE bolt (12) to between 62 and 71 lbf. in. (0.7 and 0.8 m.daN). Secure bolt (12) with lockwasher.
- (5) Install cable (3) in groove of pulley.

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Secondary Transmission Pulley - Location  
Figure 401

BM5 76 11 31 4 LAMO -13

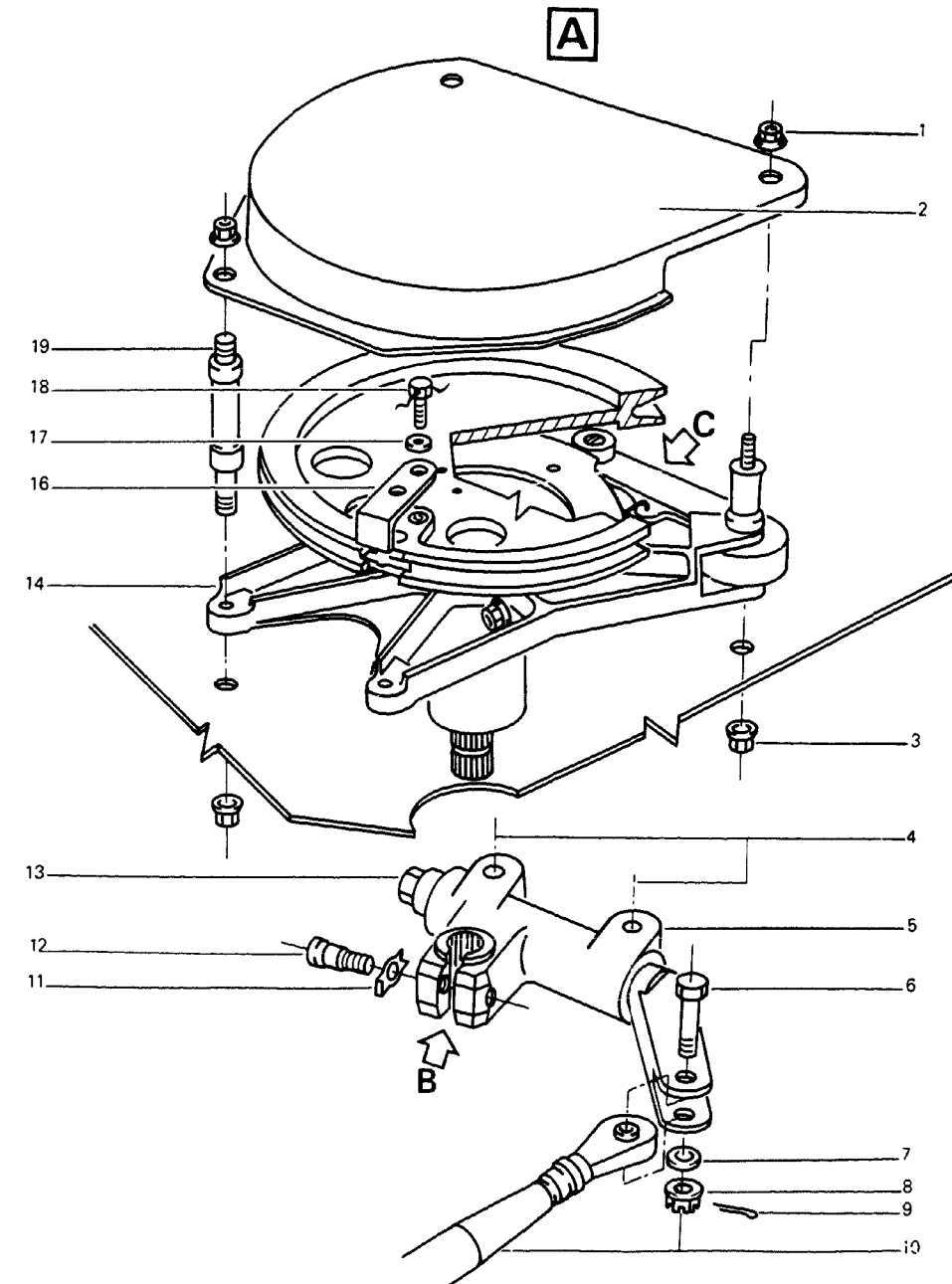
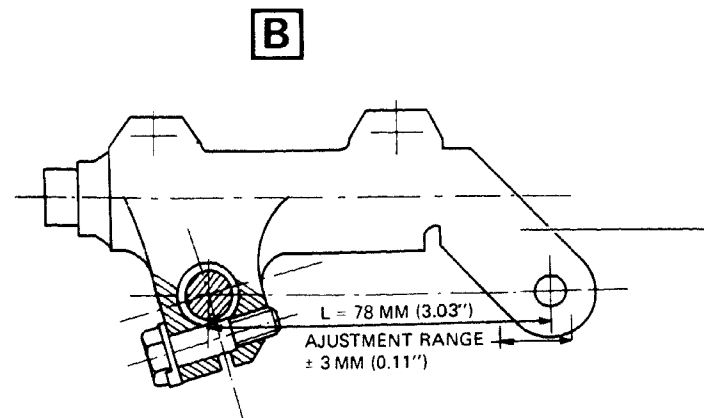
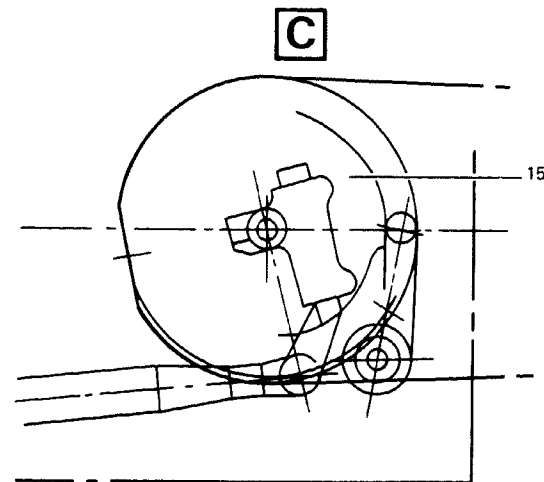
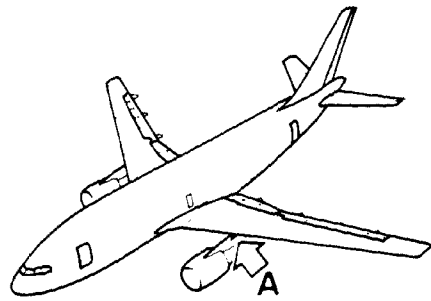
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Secondary Transmission Pulley  
Figure 402

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- (6)Open access door 512BB (612BB) on wing and check that cables are engaged in pulleys.
- (7)Tighten cable using the two turnbuckles (2), adjust cable tension (Ref. 20-29-00, P. Block 1), safety with new safety clips (1).
- (8)Close access door 512BB (612BB) on wing.
- (9)Install cable stop (16), secure with two screws (18), washers (17) and safety with lockwire.
- (10)Install cover (2) and secure with nuts (1).
- (11)Remove rigging pins 98A76101003000 and 99A76101501000.

**E. Test**

- (1)Move throttle control lever several complete cycles. During travel, check that there is no binding, no friction at secondary transmission pulley.
- (2)Move throttle control lever to Forward Full Throttle position. Check that Forward Full Throttle stop on fuel control unit is reached.  
**NOTE** : Elasticity of linkage enables throttle control lever to be displaced 8 mm (0.31 in.) beyond Forward Full Throttle through stop on FCU is already reached. If necessary, adjust length of adjustable bellcrank (5) to achieve this condition.
- (3)Move throttle control lever to Forward Idle position. Check once more that it is possible to insert easily rigging pins in autothrottle coupling unit and in primary transmission crank lever assy.  
(Ref. 76-11-00, P. Block 501).

**F. Close-Up**

- (1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
- (2)Install air bleed duct at pylon/wing junction (Ref. 36-11-00, P. Block 401).
- (3)Close access doors 471AL, 472AR, 415AL, 416AR (481AL, 482AR, 425AL and 426AR) on pylon.
- (4)Install panel 131SW (132SW) in FWD cargo compartment.
- (5)Remove warning notices.
- (6)Remove safety clips and tags and close circuits breakers 306CJ1, 308CJ1, 305CJ1, 308CJ2, 306CJ2, 1JH, 2JH, 1KG, 1KM and 2KM.
- (7)Remove access platforms.
- (8)Make certain that throttle control levers are in idle position.

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### SECONDARY TRANSMISSION - INSPECTION/CHECK

**CAUTION :** BEFORE ATTEMPTING INSPECTION/CHECK PROCEDURES FOR SECONDARY TRANSMISSION PULLEY, MAKE CERTAIN THROTTLE CONTROL LEVERS ARE IMMOBILIZED IN "IDLE" POSITION.

AS A SAFETY PRECAUTION, DISPLAY WARNING NOTICE ON FLAP CONTROL LEVER ON PANEL 429VU.

DISPLAY A WARNING NOTICE TO PROHIBIT USE OF THE GROUND HP AIR SUPPLY CONNECTIONS.

**NOTE :** Inspection/Check procedures for right and left secondary transmission pulleys are identical.

#### 1. Equipment and Materials

| ITEM                     | DESIGNATION                  |
|--------------------------|------------------------------|
| A.                       | Access Platform              |
| B.                       | Circuit Breaker Safety Clips |
| C.                       | Warning Notices              |
| Referenced Procedures    |                              |
| - 20-29-00, P. Block 1   | System Cabling               |
| - 76-11-31, P. Block 401 | Secondary Transmission       |

#### 2. Procedure

##### A. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

| PANEL | SERVICE                        | IDENT.  | LOCATION |
|-------|--------------------------------|---------|----------|
| 21VU  | AFS/TCC/SYS 1/28VDC            | 306/CJ1 | 102/H 8  |
| 21VU  | AFS/TCC/SYS 1/115VAC           | 308CJ1  | 102/H 9  |
| 21VU  | AFS/TCC/SENSORS                | 305CJ1  | 102/H10  |
| 21VU  | AFS/TCC/SYS 2/115VAC           | 308CJ2  | 102/H11  |
| 21VU  | AFS/TCC/SYS 2/28VDC            | 306CJ2  | 102/H12  |
| 133VU | ENG/ENG 1 & 2/IGNITION/SYS A   | 1JH     | 334/S72  |
| 133VU | ENG/ENG 1 & 2/IGNITION/SYS B   | 2JH     | 333/T72  |
| 133VU | ENG/ENG 1 & 2/START CTL & WARN | 1KG     | 335/R68  |
| 133VU | ENG/ENG 1/REVERSE/CTL          | 1KM     | 332/U69  |
| 133VU | ENG/ENG 2/REVERSE/CTL          | 2KM     | 331/Y74  |

(2)Position access platform at engine pylon.

(3)On panel 429VU and 9VU.

- Display warning notices prohibiting operation of throttle control levers and flap and slat control lever.

(4)On engine pylon, open access 415AL and 416AR (425AL and 426AR).

##### B. Inspection (Ref. Fig. 601)

(1)Visually inspect to confirm non migration of the adjustable lever along pulley axle.

(2)Check that no play/looseness exists between the adjustable lever and the pulley axle.

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- Confirm lock bolt and lock washer are secure.
- (3) If any doubt exists on the security of attachment:
- (a) Disassemble the adjustable lever from the pulley axle (Ref. 76-11-31, P. Block 401).
  - (b) Check the lock bolt, adjustable lever and axle splines for correct condition.
  - (c) Replace damaged hardware as necessary.
  - (e) Re-install the adjustable lever.

**F. Close-Up**

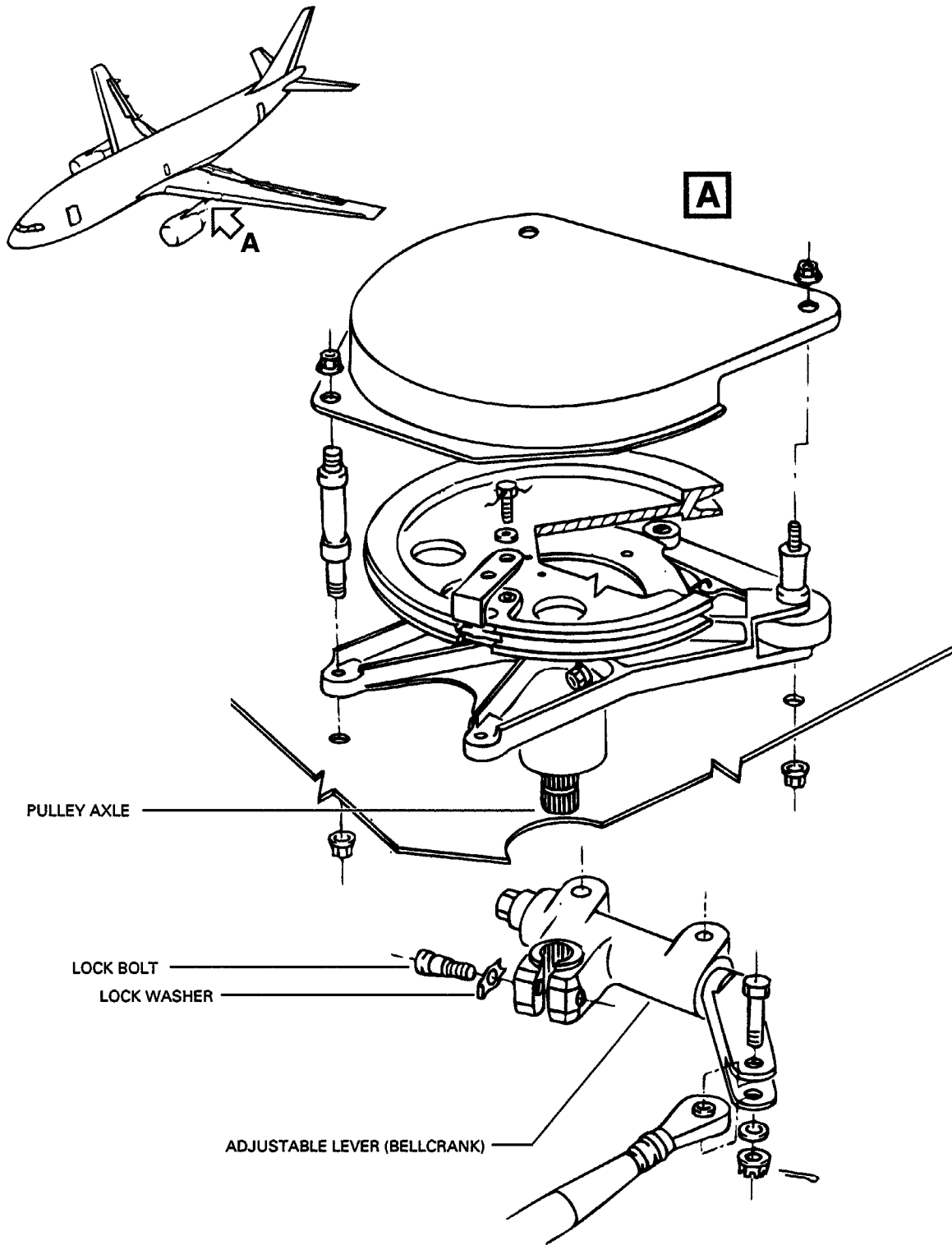
- (1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
- (2) Close access doors 415AL and 416AR (425AL and 426AR) on pylon.
- (3) Remove warning notices.
- (4) Remove safety clips and tags and close circuit breakers 306CJ1, 308CJ1, 305CJ1, 308CJ2, 306CJ2, 1JH, 2JH, 1KG, 1KM and 2KM.
- (5) Remove access platforms.

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Secondary Transmission Pulley - Location  
Figure 601

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### PRIMARY TRANSMISSION CRANK LEVER - REMOVAL/INSTALLATION

**WARNING :** BEFORE ATTEMPTING REMOVAL/INSTALLATION PROCEDURES FOR PRIMARY TRANSMISSION CRANK LEVER, MAKE CERTAIN THROTTLE CONTROL LEVERS ARE IMMOBILIZED IN IDLE POSITION AND DISPLAY A WARNING NOTICE TO PROHIBIT THEIR OPERATION. MAKE CERTAIN THAT HP FUEL SHUT-OFF VALVE CONTROL LEVERS ARE IN OFF POSITION, HP FUEL SHUT-OFF VALVE CONTROLS ON THE MEC ARE AGAINST CLOSED STOP ON EACH ENGINE AND A WARNING NOTICE HAS BEEN DISPLAYED ON PANEL 9VU. DISPLAY WARNING NOTICES ON FLAP AND SLAT CONTROL LEVER, ON PANEL 429VU. DISPLAY A WARNING NOTICE TO PROHIBIT USE OF HP GROUND CONNECTORS.

#### 1. Equipment and Materials

| ITEM                     | DESIGNATION                                         |
|--------------------------|-----------------------------------------------------|
| A.                       | Access Platform                                     |
| B. 98A27901005000        | Pin - Rigging Cable, Tension Regulator              |
| R C. RSE1041-1           | Pin - Rigging, Idler crank                          |
| D. 98A76101003000        | Pin - Rigging - Autothrottle coupling unit          |
| E. 98A27901014000        | Pin - Rigging, Nose Gear Emergency Lowering Control |
| F.                       | Circuit Breaker Safety Clips                        |
| G.                       | Cotter Pins                                         |
| H.                       | Tab washers                                         |
| I.                       | Corrosion - Resistant Steel Lockwire                |
| J. Material No. 08-004   | Bonding and Adhesive Compounds (Ref. 20-31-00)      |
| K. Material No. 08-007C  | Bonding and Adhesive Compounds (Ref. 20-31-00)      |
| or                       |                                                     |
| Material No. 08-007B     | Bonding and Adhesive Compounds (Ref. 20-31-00)      |
| L. Material No. 08-009B  | Bonding and Adhesive Compounds (Ref. 20-31-00)      |
| or                       |                                                     |
| Material No. 08-009A     | Bonding and Adhesive Compounds (Ref. 20-31-00)      |
| M. Material No. 11-026   | Cleaning Agents (Ref. 20-31-00)                     |
| N.                       | Warning Notices                                     |
| Referenced Procedures    |                                                     |
| - 36-11-00, P. Block 401 | Engine Bleed Air Supply System                      |
| - 71-13-00, P. Block 301 | Cowl doors                                          |
| - 76-11-00, P. Block 501 | Throttle Controls                                   |

#### 2. Procedure

A. Job Set-Up (Ref. Fig. 401)  
(Ref. Fig. 402)

(1)Open, safety and tag the following circuit breakers :

| PANEL | SERVICE             | IDENT. | LOCATION |
|-------|---------------------|--------|----------|
| 21VU  | AFS/TCC/SYS1/28VDC  | 306CJ1 | 102/H 8  |
| 21VU  | AFS/TCC/SYS1/115VAC | 308CJ1 | 102/H 9  |
| 21VU  | AFS/TCC/SENSOR      | 305CJ1 | 102/H10  |

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| PANEL | SERVICE                     | IDENT. | LOCATION |
|-------|-----------------------------|--------|----------|
| 21VU  | AFS/TCC/SYS1/115VAC         | 308CJ2 | 102/H11  |
| 21VU  | AFS/TCC/SYS2/28VDC          | 306CJ2 | 102/H12  |
| 133VU | ENG/ENG1&2/IGNITION/SYSA    | 1JH    | 334/S72  |
| 133VU | ENG/ENG1&2/IGNITION/SYSB    | 2JH    | 333/T72  |
| 133VU | ENG/ENG1&2/START CTL & WARN | 1KG    | 335/R68  |
| 133VU | ENG/ENG1/REV/CTL            | 1KM    | 332/U69  |
| 133VU | ENG/ENG2/REV/CTL            | 2KM    | 331/V74  |

- (2) Position access platforms at pylon of engine concerned.
- (3) On panels 429VU and 9VU.
- display a warning notice prohibiting operation of throttle control levers and flap and slat control lever.
- (4) Open access doors 414GR, 416AR, 413FL and 415AL (424GR, 426AR, 423FL and 425AL).
- (5) With throttle control levers placed in forward idle throttle position check adjustment of throttle control linkage down to secondary transmission pulley. Adjust if necessary (Ref. 76-11-00, P. Block 501).
- (6) Remove air bleed ducts by removing the two clamps at both ends and cap open ends of ducts not removed (Ref. 36-11-00, P. Block 401).
- (7) In pylon, open access door 413AZ (423AZ).
- (8) On fuselage, at STA2294 (FR40/41), remove access doors 131SW (132SW), insert rigging pin 98A76101003000 in autothrottle coupling unit and rigging pin 98A27901005000 in cable tension regulator.
- (9) Open the fan reverser cowls (Ref. 71-13-00, P. Block 301) ; install rigging pin 98A27901014000 on idler crank. (RSE1041-1)
- R (10) Loosen nuts (1), (2) and (3) until clearance of 0.05 to 0.1 in. (1.25 to 2.5 mm) is obtained.
- CAUTION** : AS THE IDLER CRANKS ARE HOLD BY SPRINGS, WHEN THE TELESCOPIC ENDS ARE REMOVED, THERE IS A RISK OF THEIR PIVOTING VIOLENTLY AND PINCHING THE FINGERS OF THE OPERATOR.
- (11) Fold tabs of washers (10) (13) (15); remove bolts (11) (12) (14), discard washers and remove telescopic rods (4) (5) (6) from associated yoke
- NOTE** : Bolts (11), (12) and (14) are installed with adhesive compound.
- (12) Remove and discard cotter pin (20), remove nut (19), washer (18), bolt (17); remove rod (16) from yoke.

#### B. Removal

- (1) Fold down tabs of washer (22); remove locking screw (21); mark position of lever (23) and remove from splined shaft ; discard tab washer (22).
- (Ref. Fig. 402) Detail B.
- (2) Remove nuts (30) (31) (32) (33) (34) and (35)
- (Ref. Fig. 403)
- (3) Remove bolts (24) (25) (26) (27) (28) and (29) ; pivot levers (7), (8) and (9) if necessary.
- (4) Remove primary transmission crank lever.
- (5) Check attach fittings and linkage for correct condition and

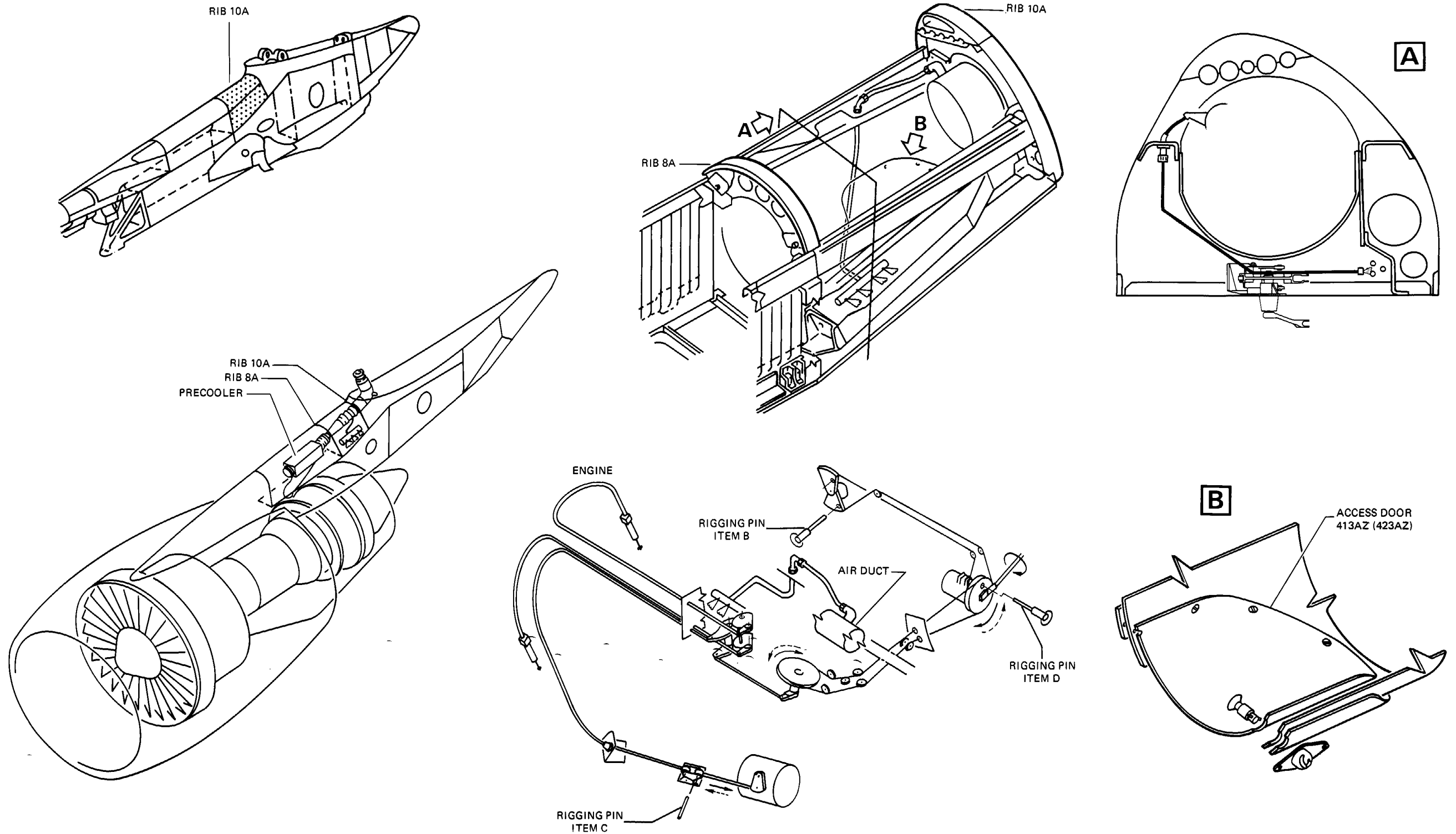
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DM5



Primary Relay Location and Rigging  
Figure 401

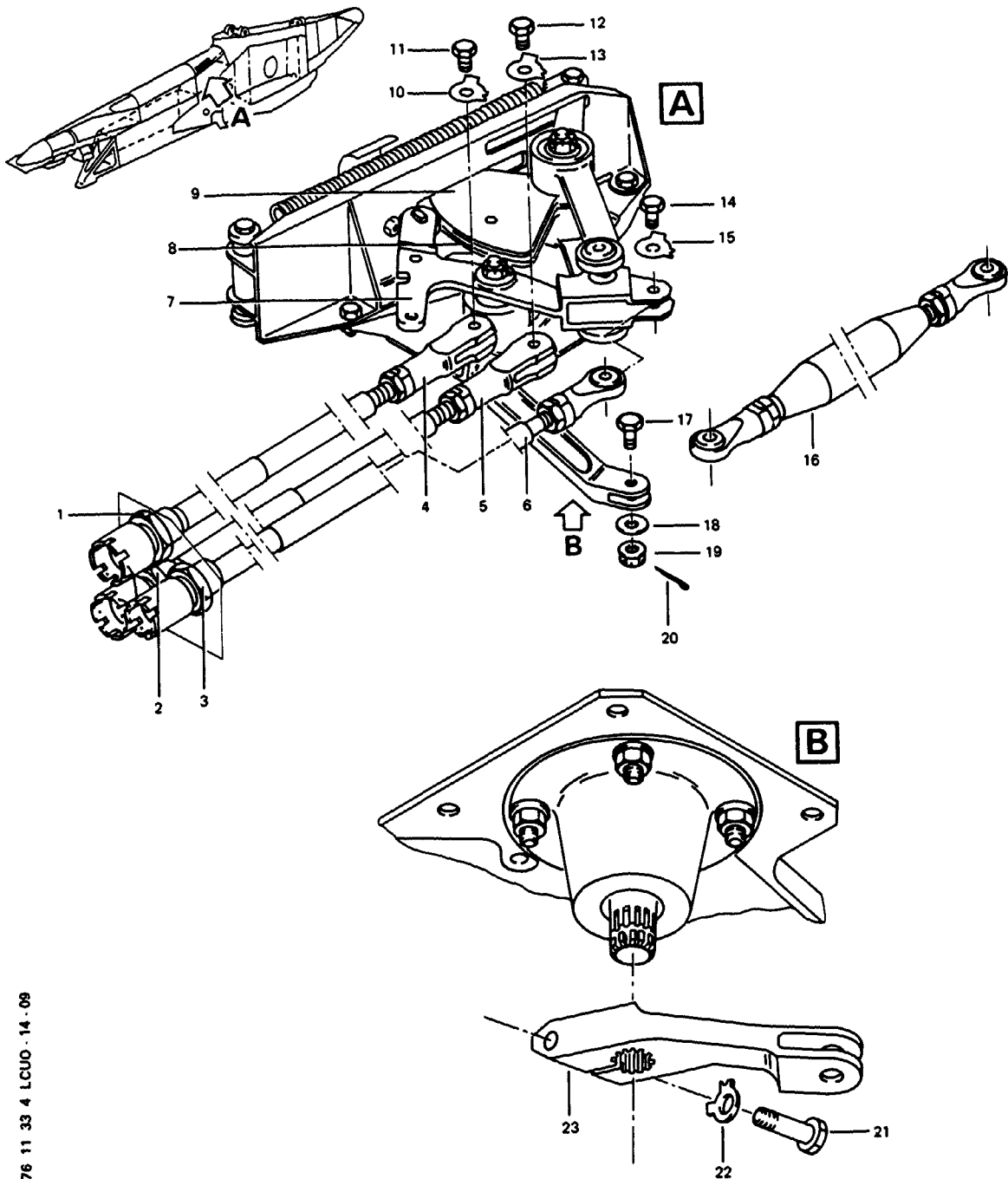
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8M5 76 11 33 4 LCUO - 14 - 09  
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Telescopic and Adjustable Rods  
Figure 402

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security of attachment and make certain that they are free from traces of wear or corrosion.

### C. Inspection/Check

- (1) By means of a non-metallic tool, remove all traces of sealant, Material No.08-004, on periphery of the six attachment holes on body.
- (2) Check that crank lever is free from traces of nicks or corrosion

### D. Installation (Ref. Fig. 402, 403)

- (1) Coat primary transmission crank lever attachment holes with Material No.08-004 and position in housing.
- (2) Install bolts (24), (25), (26), (27), (28) and (29) ; pivot levers (7), (8) and (9) if necessary.
- (3) Tighten and lock nuts (30), (31), (32), (33), (34) and (35).
- (4) Install lever (23) in its original position; install new tab washer (22); tighten screw (21); torque to between 62 and 71 lbf.in (0.7 and 0.8 m.daN). Safety screw with tab washer.
- (5) Install end of rod (16) in yoke of lever (23); install bolt (17) and washer (18), tighten nut (19); safety with a new cotter pin (20).
- (6) Install the ends of three telescopic rods (4), (5) and (6) in respective yokes of levers (7), (8) and (9) as follows.
  - (a) Remove old adhesive from threads of bolts (11), (12) and (14) and from yokes threads, then clean threads with cleaning agent (Material No. 11-026).
  - (b) Allow the threads to dry.
  - (c) Spray activator (Material No. 08-009B or Material No. 08-009A) on threads.
  - (d) Allow activator to dry following the supplier instructions.
  - (e) Apply a thin layer of adhesive compound (Material No. 08-007C or Material No. 08-007B) on the first three or four threads of the bolts.
  - (f) Install telescopic ends (4), (5) and (6) in corresponding yokes (7), (8) and (9). Install bolts (11), (12) and (14) with new washers (10), (13) and (15).
  - (g) Tighten bolts (11), (12) and (14) and fold the tab washers (10), (13) and (15).
  - (h) Remove excess adhesive with a lint-free cloth.
  - (i) Allow to dry at ambient temperature.
- NOTE** : Full resistance is obtained after 2-to-4 hour drying time.
- (7) Tighten nuts (1), (2) and (3) and wirelock.

### E. Adjustment/Test

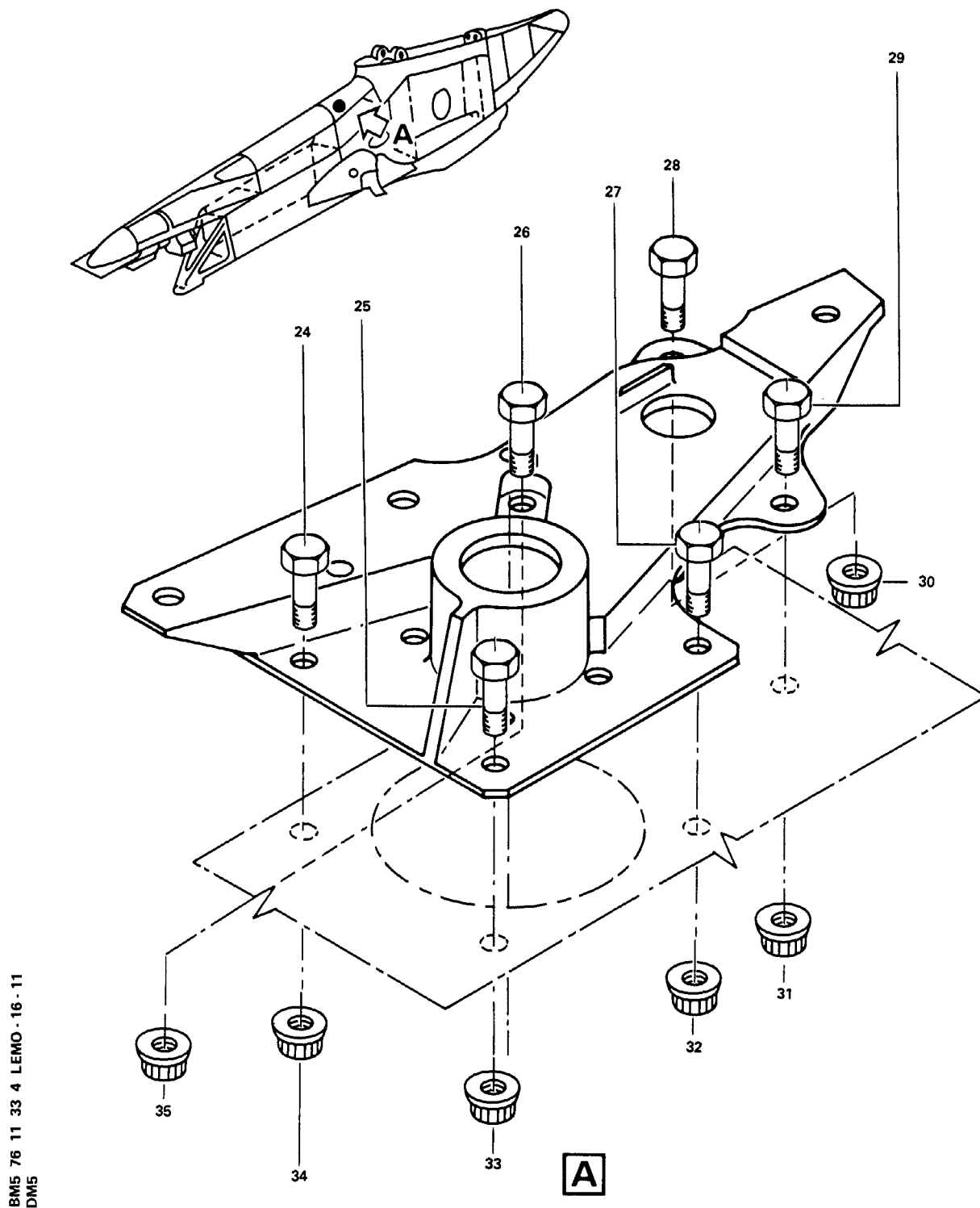
- (1) Remove rigging pins items 98A27901005000, 98A27901014000 and 98A76101003000.
- (2) Move throttle control level several complete cycles. During travel, check that there is no binding or friction.
- (3) Move throttle control lever to FFT position. Check that it is possible to insert easily rigging pins in primary transmission crank lever. Adjust if necessary (Ref. 76-11-00, P. Block 501).
- (4) Move throttle control lever to FIT position. Check that it is possible to insert rigging easily in autothrottle coupling unit and in primary transmission crank lever. Adjust if necessary

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Primary Transmission Crank Lever Mounting Base - Removal/Installation  
Figure 403

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(Ref. 76-11-00, P. Block 501).

**NOTE** : Elasticity of linkage enables throttle control lever to be displaced 8 mm (0.31 in.).

**F. Close-Up**

- (1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
- (2) Close access doors 413AZ (423AZ).
- (3) Remove blanking caps ; install air bleed ducts (Ref. 36-11-00, P. Block 401).
- (4) Close access doors 414GR, 416AR, 413FL and 415AL (424GR, 426AR, 423FL and 425AL).
- (5) Close access door 131SW (132SW).
- (6) Remove warning notice.
- (7) Close fan reverser cowls (Ref. 71-13-00, P. Block 301).
- (8) Remove safety clips and tags and close circuit breakers 306CJ1, 308CJ1, 305CJ1, 308CJ2, 306CJ2, 1JH, 2JH, 1KG, 1KM and 2KM.
- (9) Remove access platform.
- (10) Make certain that throttle control levers are in idle position.

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**PRIMARY TRANSMISSION CRANK LEVER - INSPECTION/CHECK**

**1. General**

The purpose of this procedure is to do a detailed visual inspection of primary transmission crank lever return springs.

**2. Equipment and Material**

| ITEM                     | DESIGNATION                      |
|--------------------------|----------------------------------|
| A.                       | Access Platform                  |
| B.                       | Circuit Breakers                 |
| C.                       | Warning Notice                   |
| Referenced Procedures    |                                  |
| - 71-13-00, P. Block 301 | Cowls Doors                      |
| - 76-11-33, P. Block 401 | Primary Transmission Crank Lever |

**3. Procedure**

**A. Job Set-up**

- (1)Open, safety and tag the appropriate circuit breakers and open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).
- (2)Position access platform at engine pylon.
- (3)On panel 429VU and 9VU
  - Display a warning notice prohibiting operation of throttle control levers.
- (4)On engine pylon, open access door 414ER (424ER).

**B. Visual Inspection of Primary Transmission Crank Lever Return Springs**

**NOTE** : Be careful. The electrical harness prevents access to the inspection area. To improve access to the area, it is necessary to remove the electrical harness clamp blocks and to push the harness away to correctly see the primary relay springs.

- (1)Do a detailed visual inspection of the primary relay springs and make sure that they are not broken.
- (2)If necessary, replace the primary relay (Ref. 76-11-33, P. Block 401).
- (3)Install the electrical harness clamp blocks.

**C. Close-Up**

- (1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
- (2)Close access doors 414ER (424ER).
- (3)Remove warning notice.
- (4)Close fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).
- (5)Remove safety clips and tags and close the appropriate circuit breakers.
- (6)Remove access platform.
- (7)Make certain that throttle control levers are in idle position.

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### FLEXIBLE CONTROL - REMOVAL/INSTALLATION

**WARNING** : BEFORE ATTEMPTING REMOVAL/INSTALLATION PROCEDURES FOR FLEXIBLE CONTROL, MAKE CERTAIN THROTTLE CONTROL LEVERS ARE IMMOBILIZED AND DISPLAY A WARNING NOTICE AS A SAFETY PRECAUTION.  
 ALSO DISPLAY WARNING NOTICES ON FLAP AND SLAT CONTROL LEVER, PANELS 429VU AND 9VU.

DISPLAY A WARNING NOTICE TO PROHIBIT USE OF HP GROUND CONNECTORS.

**NOTE** : Removal/installation procedures for engines 1 and 2 being identical, only removal/installation procedures for engine 1 will be described.

**NOTE** : Cables suspected to be damaged by heat and being stiff to operate, should be returned to the manufacturer for cleaning, greasing and potential repair. Operators should not separate inner core from the cable casing as they are not interchangeable and can be easily damaged during this task.

#### 1. Equipment and Materials

| ITEM                                                  | DESIGNATION                                    |
|-------------------------------------------------------|------------------------------------------------|
| A.                                                    | Access Platform                                |
| B.                                                    | Circuit Breaker Safety Clips                   |
| C.                                                    | Warning Notices                                |
| D.                                                    | Blanking Plug                                  |
| E. 99A76101500000                                     | Pin - Rigging, Primary Transmission Crank      |
| F. 99A76101501000                                     | Pin - Rigging, Throttle Control                |
| G. 98A76103503000                                     | Wrench - Castellated Nut                       |
| H. 98A76103504000                                     | Wrench - Castellated Nut                       |
| I. Material No. 08-007C<br>or<br>Material No. 08-007B | Bonding and Adhesive Compounds (Ref. 20-31-00) |
| J. Material No. 08-009B<br>or<br>Material No. 08-009A | Bonding and Adhesive Compounds (Ref. 20-31-00) |
| K. Material No. 11-026                                | Bonding and Adhesive Compounds (Ref. 20-31-00) |
| Referenced Procedures                                 | Cleaning Agents (Ref. 20-31-00)                |
| - 36-11-00, P. Block 601                              | Engine Bleed Air Supply System                 |
| - 36-11-15, P. Block 401                              | Bleed Air Precooler                            |
| - 71-13-00, P. Block 301                              | Cowl Doors                                     |
| - 76-11-00, P. Block 501                              | Throttle Control                               |

#### 2. Throttle Control Cable Procedure

##### A. Job Set-Up (Ref. Fig. 401)

(1) In flight compartment, display warning notices on throttle control levers set to forward idle throttle, on flap and slat control lever panel 429VU and on HP fuel shut off valves, panel 9VU, to prohibit maneuvers.

(2) Open, safety and tag the appropriate circuit breakers and open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).

(3) Display a warning notice to prevent use of HP ground connectors.

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- (4) Position access platform at engine pylon.
- (5) On pylon, open access doors 411BL (421BL), 411CL (421CL), 411DL (421DL), 413DL (423DL), 413CL (423CL) (Ref. Fig. 401).
- (6) Remove bleed air precooler (Ref. 36-11-15, P. Block 401). Remove air bleed duct by removing the two clamps at both ends and cap open ends of ducts not removed (Ref. 36-11-00, P. Block 401). Remove access door 413AZ (Ref. Fig. 401).
- (7) Install rigging pin 99A76101501000 in primary transmission crank lever (Ref. Fig. 406).

### B. Removal

- (1) On right side of engine (Ref. Fig. 404).
  - (a) Locate throttle cable attached to right side of engine (Ref. Fig. 404).
  - (b) Remove two bolts and clamp securing throttle cable to throttle gearbox assembly and disconnect cable. Retain hardware.
  - (c) Remove screw, washer, nut and clamp attaching bellows (9) to plate. Remove two screws, washers, nuts and clamp attaching throttle cable to plate and bracket (Ref. Fig. 404) (Detail H).
  - (d) Remove screw, two washers, and nut attaching bellows (8) clamp to wire harnesses clamp (Ref. Fig. 404) (Detail L).
  - (e) Remove screw, two washers, nut attaching bellows (7) clamp to wire harnesses clamp and bracket (Ref. Fig. 404) (Detail K).
  - (f) Remove screw, washer and nut attaching bellows (6) clamp to bracket (Ref. Fig. 404) (Detail G).
  - (g) Remove screw, washer and nut attaching bellows (5) clamp to fuel hose bracket (Ref. Fig. 404) (Detail F).
  - (h) Remove screw, washer and nut attaching bellows (4) clamp to bracket (Ref. Fig. 404) (Detail E).
  - (i) Remove screw, washer and nut attaching bellows (1) clamp to bracket (Ref. Fig. 404) (Detail M).
  - (j) Remove screw, washer and nut attaching together bellows (1) clamp and wire harnesses clamp (Ref. Fig. 404) (Detail D).
  - (k) Cut and remove lockwires attaching couplings. Disconnect and remove couplings, bellows from (9) to (4) and supports. Disconnect manifold (2) from core cowl cooling air manifold (3). Remove couplings bellows (2) and (1) supports and orifice (Ref. Fig. 404) (Details A and B).
  - (l) At forward engine mount, remove bolt (19), washer (18) and clamp (17) (Ref. Fig. 403) (Detail D).
  - (m) Remove nut (12), bolt (15), washer (14) and clamp (13) securing flexible control to duct (Ref. Fig. 403) (Detail C).
- (2) At pylon, between RIB A8 and RIB J08
  - (a) Cut and remove lockwire and remove cover (84), seal (86) and half washers (85) and (87) (Ref. Fig. 405) (Detail R).
  - (b) Remove nut (89), bolt (92), washer (91) and clamp (90) (Ref. Fig. 405) (Detail S).
- (3) At RIB J08
  - (a) Cut and remove lockwire and remove cover (69), half washers (70) and (72) and seal (71) (Ref. Fig. 405) (Detail P).
  - (b) Remove nuts (62), washers (63) and bolts (64). Remove covers (66) and (65), seal (67) and seal retainers (68) (Ref. Fig. 405) (Detail P).

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- (4)At pylon, between RIB J08 and RIB 8A
  - (a)Remove nut (54), bolt (58), washer (57) and clamps (55), (56) and (59) (Ref. Fig. 405) (Detail N).
  - (b)Remove bolts (47), washers (48) and clamp blocks (49) and (50) (Ref. Fig. 405) (Detail L).
  - (c)Remove the fire remaining clamp blocks as follows :
    - 1 Remove nut (37), bolts (42) and (43), washers (41) and (44) and clamp blocks (45) and (46) (Ref. Fig. 405) (Detail K).
- (5)At pylon, between RIB 8A and RIB 10A (Ref. Fig. 406)
  - (a)On primary crank lever, unsafety and remove bolt (93) discard lockwasher (94).
 

**NOTE :** Bolt (93) is installed with adhesive compound.
  - (b)Unsafety and remove castellated nut (103).
  - (c)Unsafety telescopic end (95) and locknut (97). Remove end and locknut. Discard lockwasher (96).
  - (d)Remove nut (101).
  - (e)Disengage cable from plate (102).
  - (f)Remove cable.
- (6)At pylon at RIB J08
  - (a)Draw cables leading from pylon by sliding them through packing gland supports (60) and (61) (Ref. Fig. 405) (Detail P).
- (7)Draw cable leading from throttle control box by sliding it through packing gland support (88) (Ref. Fig. 405) (Detail R).
- (8)Cable being removed, remove split bushes : (38 and (52) (Ref. Fig. 405) (Details K and L), for cable (98) (Ref. Fig. 406).

### C. Preparation of Replacement Component

- R (1)On cable (98) (Ref. Fig. 406):
  - (a)Install covers (84) and (69) (Ref. Fig. 405) (Details R and P).
  - (b)Install split bushes (52) and (38) (Ref. Fig. 405) (Details L and K).
  - (c)Install castellated nut (103) (Ref. Fig. 406).
  - (d)Check diameter.

### D. Installation

- (1)At pylon, between RIB A8 and RIB J08
  - (a)Insert end of cable (98) (Ref. Fig. 406) leading to throttle control through support (88) (Ref. Fig. 405) (Detail R).
  - (b)Insert cable leading to primary transmission crank lever through support (60) (Ref. Fig. 405) (Detail P).
- (2)Position cable along pylon, engine and thrust reverser cowl.
 

**CAUTION :** CHECK THAT CABLE RUNS ARE NOT CROSSED IN PYLON AND ENGINE.  
FOR CABLE CHECK LINKAGE BETWEEN PRIMARY TRANSMISSION CRANK LEVER AND CONTROL ON ENGINE.
- (3)At pylon, between RIB 8A and RIB 10A
  - (a)At primary transmission crank lever, install nut (101) without tightening (Ref. Fig. 406).
  - (b)Screw nut (97), install new lockwasher (96), screw in rod end (95) on telescopic ends without tightening (Ref. Fig. 406).
  - (c)Adjust each cable (Ref. 76-11-00, P. Block 501).
  - (d)At primary transmission crank lever, tighten three castellated nuts

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- (103). Safety castellated nuts (103) with lockwire (Ref. Fig. 406).
- R (e) Install telescopic end in corresponding lever (Ref. Fig. 406).
- 1 Remove old adhesive from threads of bolt (93) and lever hole, then clean thread with cleaning agent (Material No. 11-026).
  - 2 Allow the threads to dry.
  - 3 Spray activator (Material No. 08-009B or Material No. 08-009A) on threads.
  - 4 Allow activator to dry following the supplier instructions.
  - 5 Apply a thin layer of adhesive compound (Material No. 08-007C and Material No. 08-007B) on the first three or four threads of the bolts.
  - 6 Install telescopic end (95) in corresponding lever. Install bolt (93) with new washer (94).
  - 7 Tighten bolt (93) and fold the tab washer (94).
  - 8 Remove excess adhesive with a lint-free cloth.
  - 9 Allow to dry at ambient temperature.
- NOTE** : Full resistance is obtained after 2-to-4 hour drying time.
- R (f) Tighten nuts (97) and fold tabwashers (96) (Ref. Fig. 406).
- R (g) Rig primary transmission upper lever in the position corresponding to 80°.
- R (h) Make certain that throttle control box 80° rigging pin can be inserted. If not, adjust push-pull cable turnbuckle until this can be done.
- R (i) Remove rigging pins and proceed with several complete cycles (6 times) of throttle control levers and verify with primary transmission rigging pin installed at 80° that it is possible to rig throttle control box at the 80° position.
- NOTE** : When verifying adjustment always make sure that rigging pins are installed during FWD travel to eliminate throttle control hysteresis.  
If you overshoot return throttle control levers to idle position, repeat the operation.
- (4) At pylon, between RIB J08 and RIB 8A
- (a) Install flexible cables and split bushes on clamp blocks (45) and (46), install bolts (42) and (43) with washers (41) and (44) and nut (37) (Ref. Fig. 405) (Detail K).
  - (b) Install flexible cables and split bushes on clamp blocks (49) and (50), install bolts (47) with washers (48) (Ref. Fig. 405) (Detail L).
  - (c) Install clamps (56) and (59), bolt (58), washer (57) and nut (54) and tighten nut (Ref. Fig. 405) (Detail N).
- (5) At pylon, between RIB A8 and RIB J08
- (a) At RIB J08 install half washers (70) and (72), seal (71) and cover (69), tighten and wirelock cover. Install seal retainers (68), seal (67), covers (66) and (65) and install bolts (64), washers (63) and nut (62), tighten nut (Ref. Fig. 405) (Detail P).
  - (b) At RIB A11, install clamp (90), washer (91), bolt (92) and nut (89), tighten nut (Ref. Fig. 405) (Detail S).
  - (c) Install half washers (85) and (87), seal (86) and cover (84). Tighten and wirelock cover (Ref. Fig. 405) (Detail R).
- (6) At forward engine mount
- (a) Install clamp (13) and secure to clamp (16) with washer (14), bolt (15) and nut (12), tighten nut (Ref. Fig. 403) (Detail C).
  - (b) Install clamp (17), washer (18) and bolt (19), tighten bolt

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(Ref. Fig. 403) (Detail D).

(7) On right side of engine

- (a) Position orifice and bellows (1) onto throttle cable as shown (Ref. Fig. 404) (Detail A). Attach bellows to throttle cable using support and coupling. Wirelock.
  - (b) Position "tee" manifold (2) onto throttle cable (Ref. Fig. 404) (Detail A). Attach manifold (2) to previously installed bellows (1) and core cowl cooling air manifold (3) using two supports and two couplings. Wirelock.
  - (c) Position bellows (4) onto throttle cable (Ref. Fig. 404) (Detail B). Attach bellows (4) to "tee" manifold (2) using support and coupling. Wirelock.
  - (d) Position two bellows (5) and (6) onto throttle cable. Attach bellows together and to previously installed bellows (4) using supports and couplings (Ref. Fig. 404) (Detail B). Wirelock.
  - (e) Position bellows (7) and two bellows (8) and (9) onto throttle cable. Attach bellows together and to previously installed bellows (6) using supports and couplings. Wirelock.
  - (f) Position support and coupling onto remaining end of bellows (9) (Ref. Fig. 404) (Detail C). Wirelock.
  - (g) Position clamp onto bellows (1) and clamp onto wire harnesses (Ref. Fig. 404) (Detail D). Attach clamps together using screw, washer, and nut. Tighten nut fingertight only.
  - (h) Position clamp onto bellows (1), (Ref. Fig. 404) (Detail M). Attach clamp to bracket using screw, washer, and nut. Tighten nut fingertight only.
  - (i) Position clamp onto bellows (4), (Ref. Fig. 404) (Detail E). Attach clamp to bracket using screw, washer, and nut. Tighten nut fingertight only.
  - (j) Position clamp onto bellows (5), (Ref. Fig. 404) (Detail F). Attach clamp onto fuel hose bracket using screw, washer, and nut. Tighten nut fingertight only.
  - (k) Position clamp onto bellows (6), (Ref. Fig. 404) (Detail G). Attach clamp to bracket using screw, washer and nuts. Tighten nut fingertight.
  - (l) Position clamp onto bellows (7). Clamp is to be installed on the lower hole of bracket (Ref. Fig. 404) (Detail K). Attach clamps onto fuel hose bracket using screw, two washers, and nut. Tighten nuts fingertight only.
  - (m) Position clamp onto bellows (8) and clamp onto wire harnesses (Ref. Fig. 404) (Detail L). Attach clamps using screw, two washers, and nut. Tighten nut fingertight only.
- NOTE** : Make sure to bend bellows around high pressure bleed valve flexible cooling tube to avoid contact.
- (n) Position clamp onto throttle cable (Ref. Fig. 404) (Detail H). Attach clamp and plate onto bracket using two screws, two washers, and two nuts. Tighten nuts fingertight.
  - (o) Position clamp onto bellows (9), (Ref. Fig. 404) (Detail H). Attach clamp onto bracket using screw, washer, and nut. Tighten nut fingertight.
  - (p) Connect throttle cable to throttle gearbox assembly (Ref. Fig. 404). Position clamp onto throttle cable and throttle gearbox assembly and

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attach using two bolts. TORQUE bolts to between 28 and 32 lbf.in. (0.31 and 0.36 m.daN) and wirelock.

Procedures for type and size of bolts to be installed.

- (q)Close quick-disconnect clamp attaching throttle cable to bracket.
- (r)TORQUE screws and nuts that were formerly left fingertight to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).
- (s)Check the clearance between the installed throttle cable cooling system and the thrust reverser door to make sure it does not rub. Use clay, approximately 1.00 in. (25.4 mm) thick on all high points on the cooling shroud system.

**NOTE** : Verify that the throttle cable installed on the support tube does not chafe on the thrust reverser door. Adjust the bracket at the slotted mounting holes as necessary to avoid chafing (Ref. Fig. 404).

**E. Adjustment/Test**

- (1)Remove rigging pin 99A76101501000 from primary transmission crank lever (Ref. Fig. 406).
- (2)Manually translate thrust reverser to full stowed position.
- (3)Remove square drive handle and install lockout plate to CDU, secure with two bolts.
- (4)Return manual brake release lever to normal secured position.
- (5)Perform adjustment/test (Ref. 76-11-00, P. Block 501).

**F. Inspection/Check**

- (1)To prevent push pull cable heat related damage ; it is recommended to detect air leaks before they can affect push pull cable integrity (Ref. 36-11-00, P. Block 601).  
Aluminum foil wrapped around suspect couplings could be used to detect air leaks.
- (2)High nacelle temperature warnings should lead to push-pull cable inspection for evidence of overheating.

**G. Close-Up**

**NOTE** : Perform close-up and test only if feedback cables have not to be removed.

**3. Feedback Cables Procedure**

**NOTE** : Removal/installation procedures for left and right feedback cables being identical, only removal/installation procedures for left side is described.

**A. Job Set-Up (Ref. Fig. 401)**

- (1)In flight compartment, display warning notices on throttle control levers set to forward idle throttle, on flap and slat control lever panel 429VU and on HP fuel shut off valves, panel 9VU, to prohibit maneuvers.
- (2)Open, safety and tag the appropriate circuit breakers and open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).
- (3)Display a warning notice to prevent use of HP ground connectors.
- (4)Position access platform at engine pylon.

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- (5) On pylon, open access doors 411BL (421BL), 411CL (421CL), 411DL (421DL), 413DL (423DL), 413CL (423CL) (Ref. Fig. 401).
- (6) Remove bleed air precooler (Ref. 36-11-15, P. Block 401). Remove air bleed duct by removing the two clamps at both ends and cap open ends of ducts not removed (Ref. 36-11-00, P. Block 401). Remove access door 413AZ (Ref. Fig. 401).
- (7) Translate thrust reverser as follows :
  - (a) Release Center Drive Unit (CDU) brake by pulling handle out, CDU (approximately 60°) until a flat is felt.
  - (b) Remove two bolts securing lockout plate to CDU and remove plate.
  - (c) Install 0.25 in. (6.35 mm) square drive handle into auxiliary pad of CDU. Crank reverser toward full deploy position.
- (8) Insert rigging pin 99A76101500000 at primary transmission crank lever (Ref. Fig. 406).

### B. Removal

- (1) On both sides of engine.
  - (a) Unsafety, discard cotter pin (4), remove nut (3), washer (2) (Ref. Fig. 402).
  - (b) Unsafety, remove nut (6), disengage cable (5) from centerdrive unit (1) and remove elbowed cable guide (7) (Ref. Fig. 402).
  - (c) Remove nuts (23), bolts (20), washers (21) and clamps (22) (Ref. Fig. 403) (Detail E).
  - (d) Remove nut (28), bolt (26), washer (27) and clamp (25). Remove cable from thrust reverser cowl (Ref. Fig. 403) (Detail F).
- (2) At pylon, between RIB A8 and RIB J08.
  - (a) Remove nuts (8), bolts (11), washers (10) and clamps (9) (Ref. Fig. 403) (Detail B).
  - (b) At RIB A9, remove nuts (83), bolts (77), washers (78), bolts (73), (75), washers (74), (76) and remove clamp blocks (79) and (82) (Ref. Fig. 405) (Detail Q).
- (3) At pylon, between RIB J08 and RIB 8A.
  - (a) Remove nut (54), bolt (58), washer (57) and clamps (55), (56) and (59) (Ref. Fig. 405) (Detail N).
  - (b) Remove bolts (47), washers (48) and clamp blocks (49) and (50) (Ref. Fig. 405) (Detail L).
  - (c) Remove the fire remaining clamp blocks as follows :
    - 1 Remove nut (37), bolts (42) and (43), washers (41) and (44) and clamp blocks (45) and (46) (Ref. Fig. 405) (Detail K).
- (4) At pylon, between RIB 8A and RIB 10A (Ref. Fig. 406).
  - (a) On primary crank lever, unsafety and remove bolts (93) discard lockwashers (94).
 

**NOTE :** Bolts (93) are installed with adhesive compound.
  - (b) Unsafety and remove castellated nuts (103).
  - (c) Unsafety telescopic ends (95) and locknuts (97). Remove ends and locknuts. Discard lockwashers (96).
  - (d) Remove two nuts (101).
  - (e) Disengage two cables from plate (102).
  - (f) Remove the two cables.
- (5) Cables being removed, remove split bushes : (39), (53) and (81)

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- (Ref. Fig. 405) (Details K, L and Q), for cable (100)  
(Ref. Fig. 406).  
(6) Cables being removed, remove split bushes : (40), (51) and  
(80) (Ref. Fig. 405) (Details K, L and Q), for cable (99)  
(Ref. Fig. 406).

### C. Preparation of Replacement Component

- (1) On cable (99) (Ref. Fig. 406) :  
(a) Install split bushes (40), (51) and (80) (Ref. Fig. 405) (Details K, L and Q).  
(b) Install castellated nut (103) (Ref. Fig. 406).  
(c) Check diameter.  
(2) On cable (100) (Ref. Fig. 406) :  
(a) Install split bushes (39), (53) and (81) (Ref. Fig. 405) (Details K, L and Q).  
(b) Install castellated nut (103) (Ref. Fig. 406).  
(c) Check diameter.

### D. Installation

- (1) At pylon, between RIB A8 and RIB J08  
(a) Insert end of cables (5) leading to center drive units through holes at RIB A8 (Ref. Fig. 402).  
(2) Position cables along pylon, engine and thrust reverser cowl.  
**CAUTION** : CHECK THAT CABLE RUNS ARE NOT CROSSED IN PYLON AND ENGINE.  
FOR EACH CABLE CHECK LINKAGE BETWEEN PRIMARY TRANSMISSION CRANK LEVER AND CONTROL ON ENGINE.  
(3) At pylon, between RIB 8A and RIB 10A  
(a) At primary transmission crank lever, install two nuts (101) without tightening (Ref. Fig. 406).  
(b) Screw nuts (97), install new lockwashers (96), screw in rod ends (95) on telescopic ends without tightening (Ref. Fig. 406).  
(c) Adjust each cable (Ref. 76-11-00, P. Block 501).  
(d) At primary transmission crank lever, tighten three castellated nuts (103). Safety castellated nuts (103) with lockwire (Ref. Fig. 406).  
(e) Install telescopic ends in corresponding lever (Ref. Fig. 406).  
1 Remove old adhesive from threads of bolts (93) and lever holes, then clean threads with cleaning agent (Material No. 11-026).  
2 Allow the threads to dry.  
3 Spray activator (Material No. 08-009B or Material No. 08-009A) on threads.  
4 Allow activator to dry following the supplier instructions.  
5 Apply a thin layer of adhesive compound (Material No. 08-007C or Material No. 08-007B) on the first three or four threads of the bolts.  
6 Install telescopic ends (95) in corresponding levers. Install bolts (93) with new washers (94).  
7 Tighten bolts (93) and fold the tab washers (94).  
8 Remove excess adhesive with a lint-free cloth.  
9 Allow to dry at ambient temperature.  
**NOTE** : Full resistance is obtained after 2-to-4 hour drying time.  
(f) Tighten nuts (97) and fold tab washers (96) (Ref. Fig. 406).  
(4) At pylon, between RIB J08 and RIB 8A

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- (a) Install flexible cables and split bushes on clamp blocks (45) and (46), install bolts (42) and (43) with washers (41) and (44) and nut (37) (Ref. Fig. 405) (Detail K).
- (b) Install flexible cables and split bushes on clamp blocks (49) and (50), install bolts (47) with washers (48) (Ref. Fig. 405) (Detail L).
- (c) Install clamps (56) and (59), bolt (58), washer (57) and nut (54) and tighten nut (Ref. Fig. 405) (Detail N).
- (5) At pylon, between RIB A8 and RIB J08
  - (a) At RIB A9, install flexible cables with split bushes on clamp blocks (79) and (82), install washers (74) and (76) and bolts (73) and (75); install washers (78), bolts (77) and nuts (83), tighten nuts (Ref. Fig. 405) (Detail Q).
  - (b) At RIB A8, install clamps (9), washers (10), bolts (11) and nuts (8), tighten nuts (Ref. Fig. 403) (Detail B).
- (6) On thrust reverser cowls
  - (a) Install clamps (22), washers (21), bolts (20) and nuts (23), tighten nuts (Ref. Fig. 403) (Detail E).
  - (b) Install clamp (25) and secure to clamp (24) with washer (27), bolt (26) and nut (28), tighten nut (Ref. Fig. 403) (Detail F).
- (7) At center drive unit (Ref. Fig. 402)
  - (a) Engage cable (5) in center drive unit, screw in nut (6) on center drive unit and direct elbowed cable guide (7) properly.
  - (b) Install washer (2) and nut (3).
  - (c) Tighten nut (6) and safety with lockwire.
  - (d) Tighten nut (3) and safety with new cotter pin (4).

**E. Adjustment/Test**

- (1) Remove rigging pin 99A76101500000 from primary transmission crank lever (Ref. Fig. 406).
- (2) Manually translate thrust reverser to full stowed position.
- (3) Remove square drive handle and install lockout plate to CDU, secure with two bolts.
- (4) Return manual brake release lever to normal secured position.
- (5) Operate thrust and throttle control levers several times and check for binding.  
In case of friction points, adjust (Ref. 76-11-00, P. Block 501).

**F. Inspection/Check**

- (1) To prevent push pull cable heat related damage; it is recommended to detect air leaks before they can affect push pull cable integrity (Ref. 36-11-00, P. Block 601).  
Aluminum foil wrapped around suspect couplings could be used to detect air leaks.
- (2) High nacelle temperature warnings should lead to push-pull cable inspection for evidence of overheating.

**G. Close-Up**

- (1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
- (2) Close access door 413AZ (Ref. Fig. 401).
- (3) Between RIB 8A and RIB 10A, remove blanking caps and install bleed

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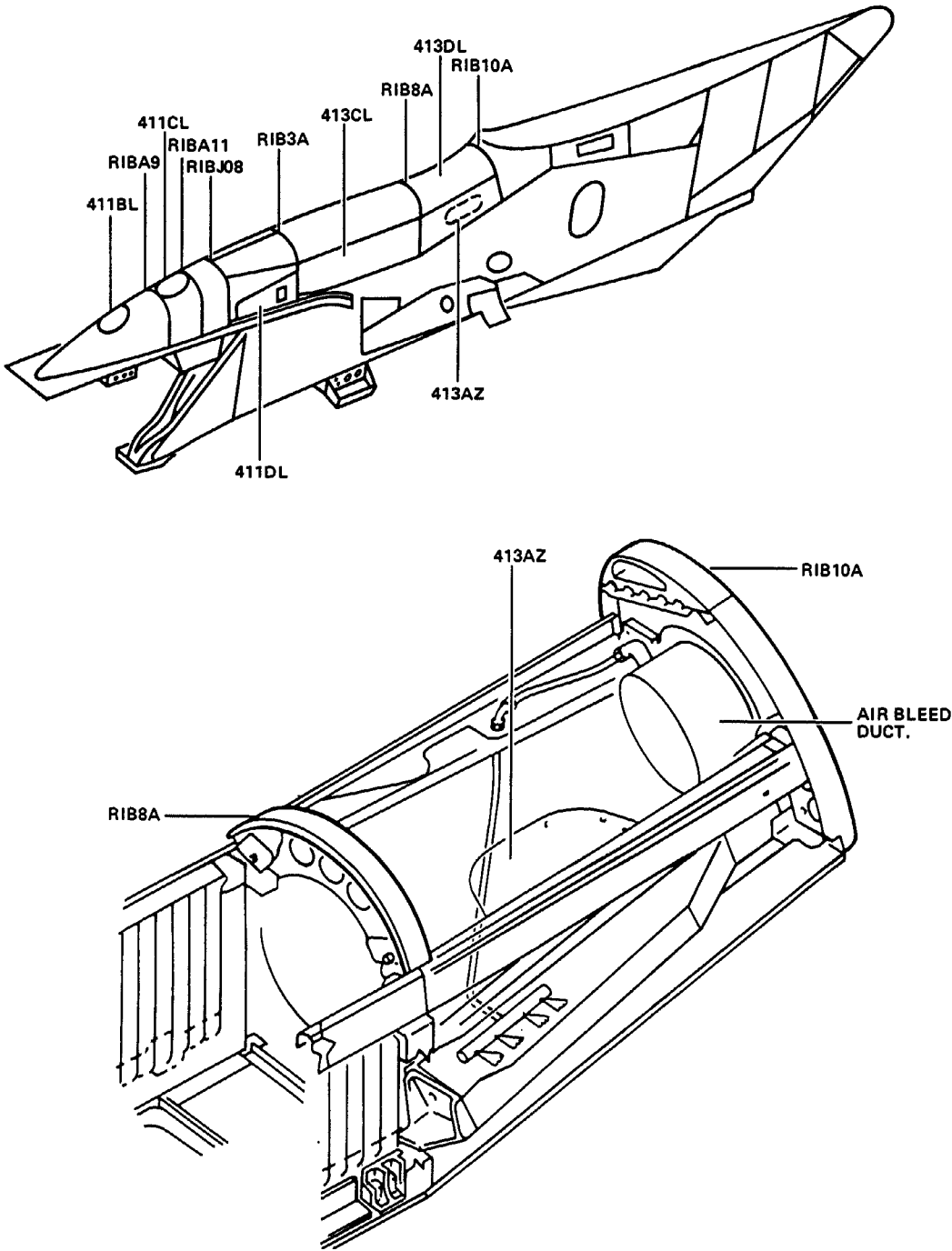
- air duct and install bleed air precooler (Ref. 36-11-15, P. Block 401).
- (4)At pylon, close access doors 411BL (421BL), 411CL (421CL), 411DL (421DL), 413DL (423DL), 413CL (423CL).
  - (5)Remove access platform.
  - (6)Close thrust reverser and fan cowl doors, remove safety clips and tags and close circuit breakers (Ref. 71-13-00, P. Block 301).
  - (7)Remove warning notices prohibiting maneuvers.
  - (8)Make certain that throttle control levers are in idle position.

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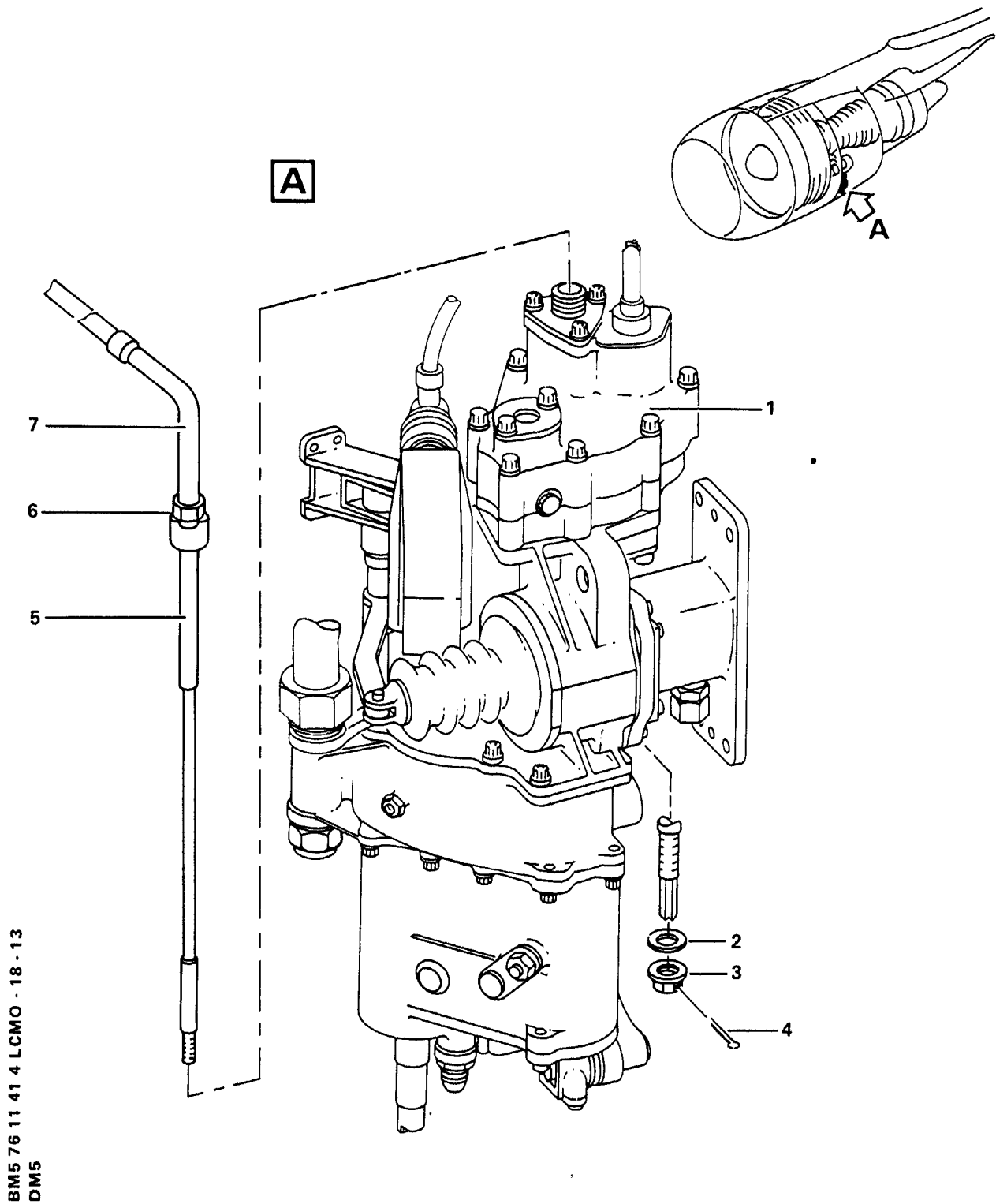
Access Doors - Location  
Figure 401

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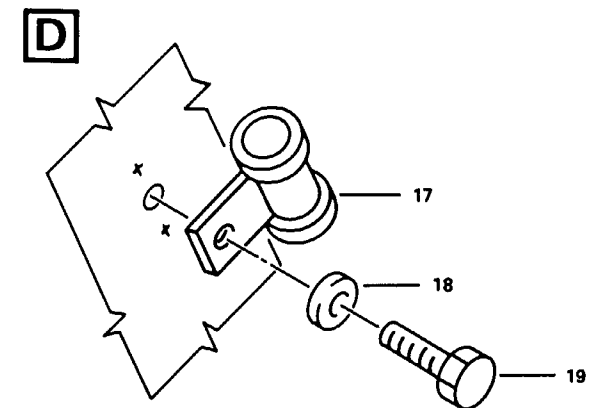
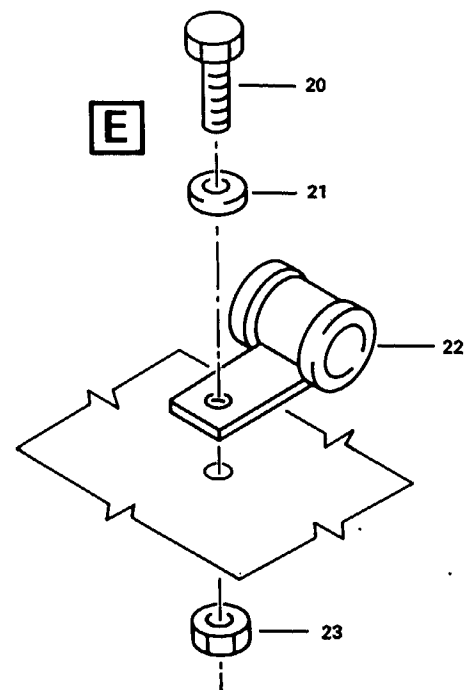
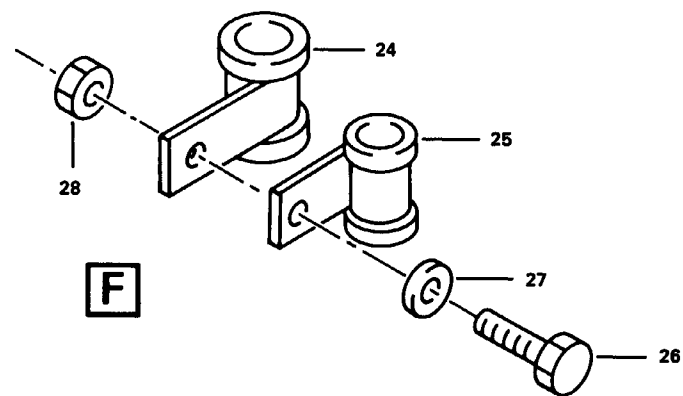
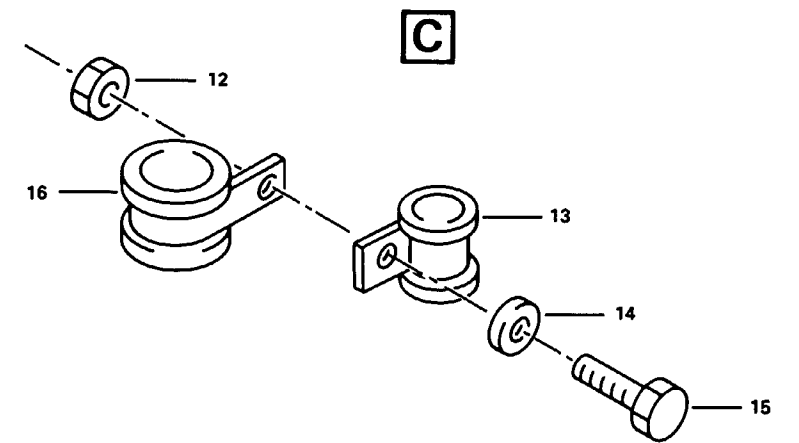
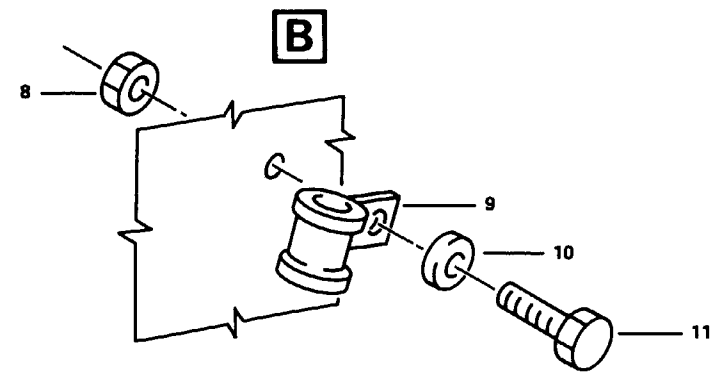
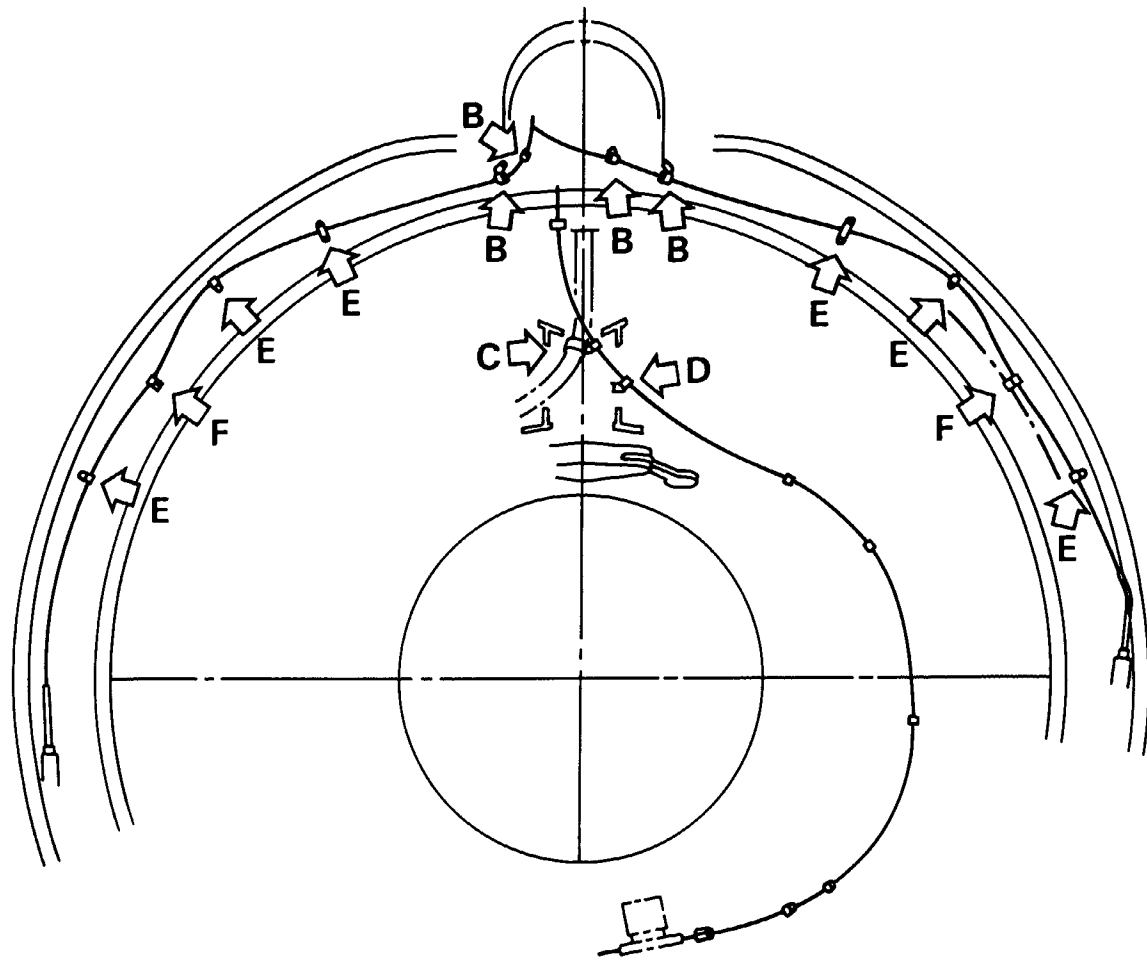
Cable Disconnection at Center Drive Unit  
Figure 402

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Throttle Control and Interlock Attachment  
Figure 403

BMS 76 11 41 4 LEMO - 18 - 13  
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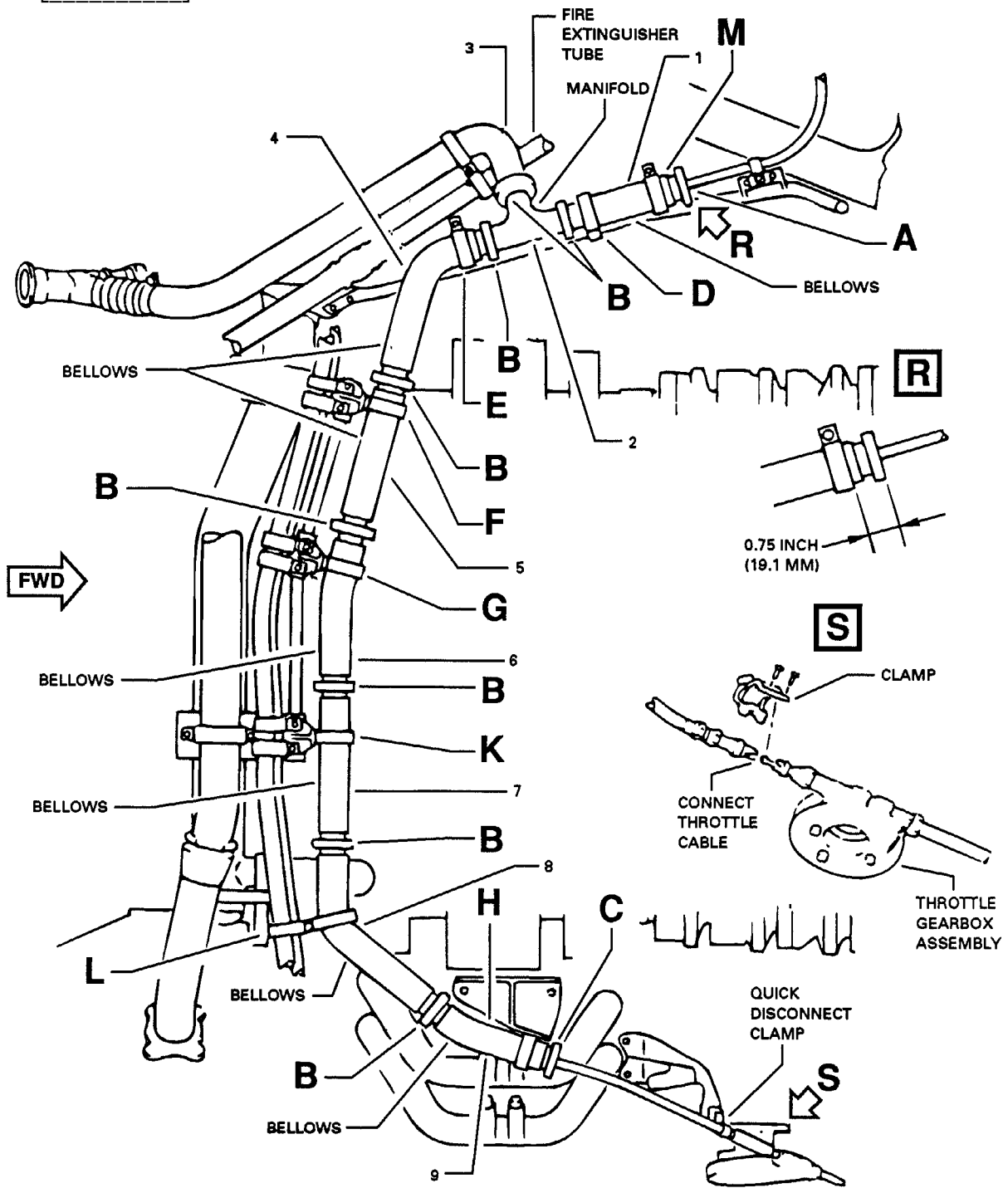
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Throttle Control - Right Side (Sheet 1/5)  
Figure 404

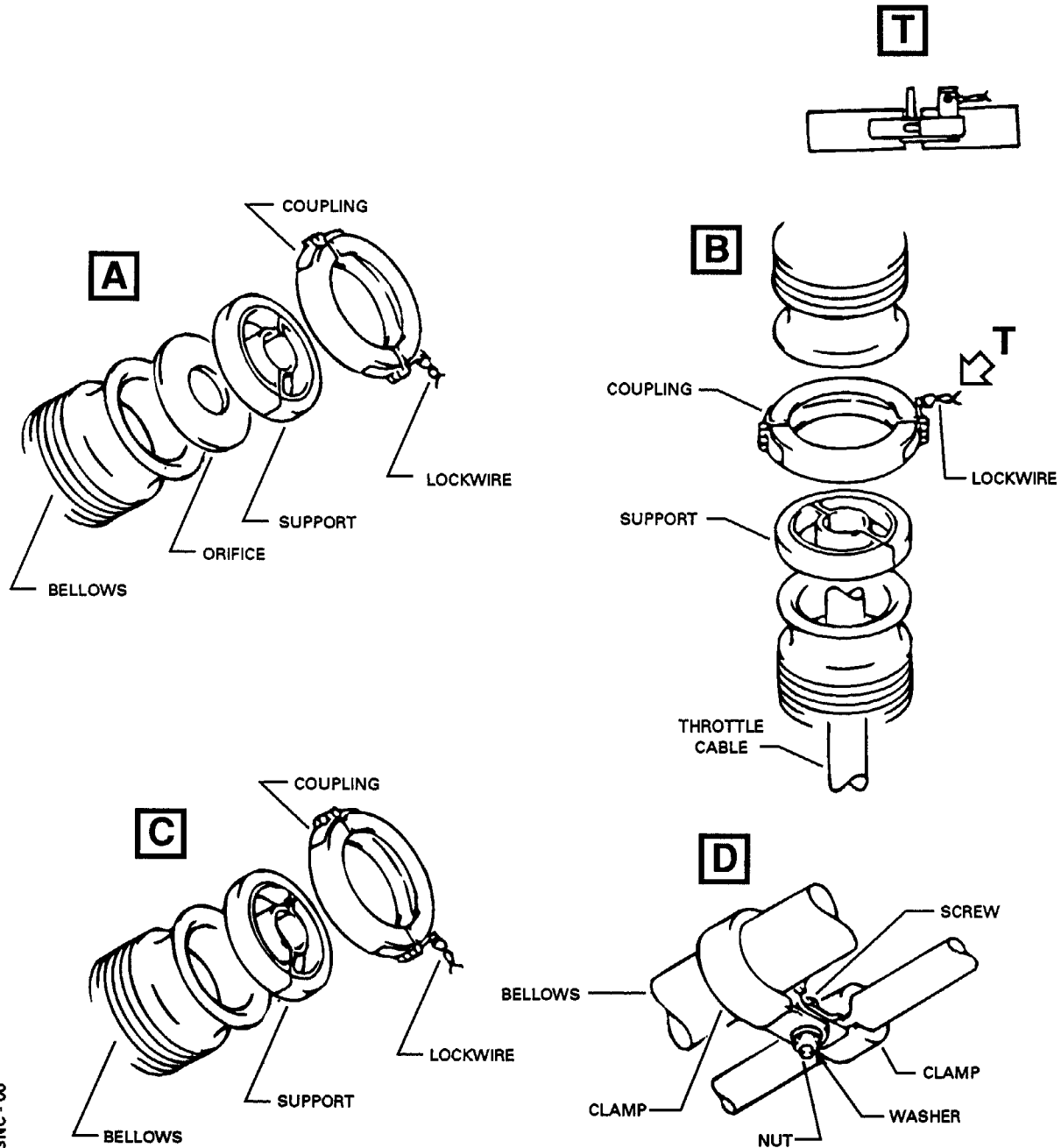
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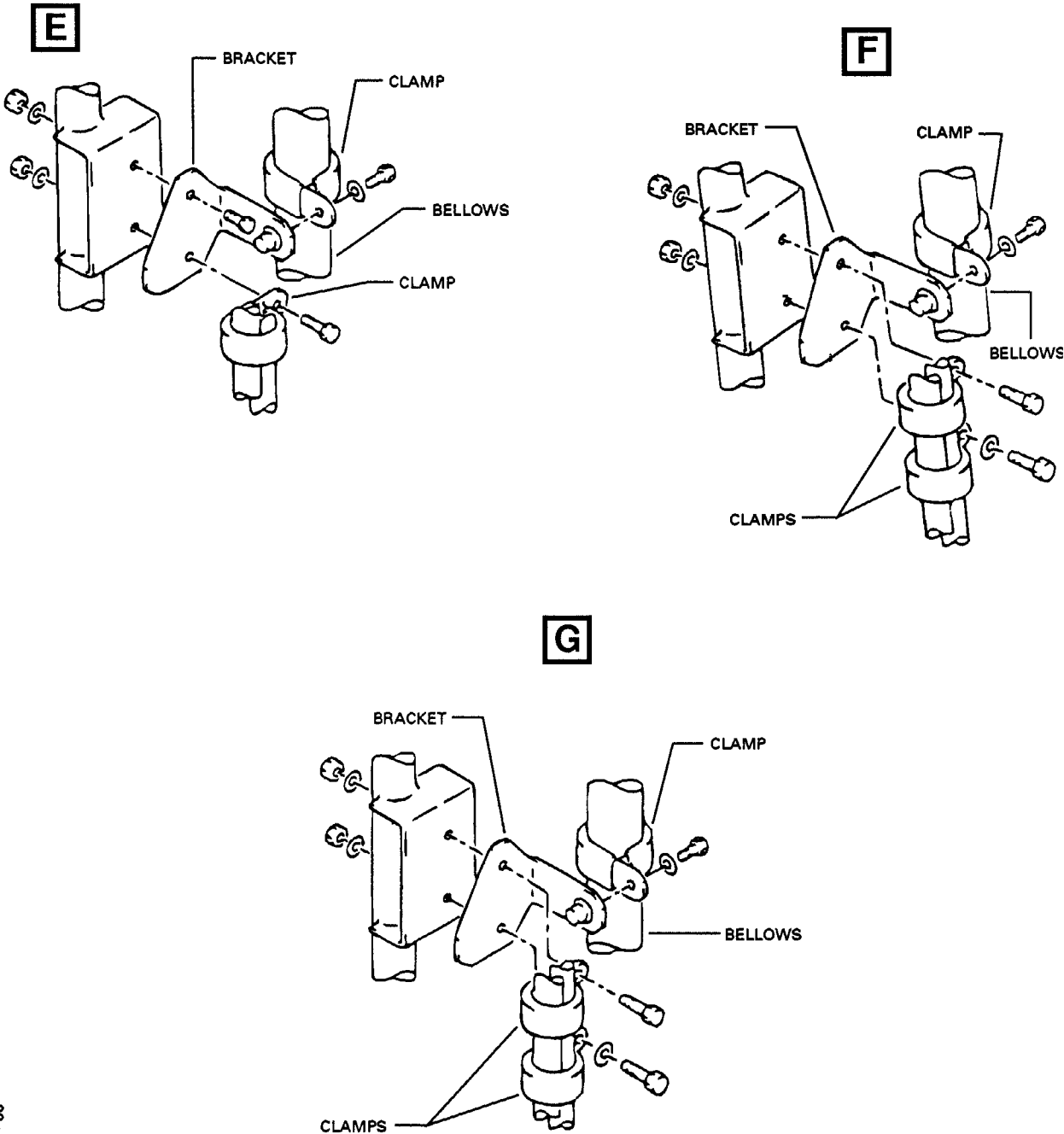
Throttle Control - Right Side (Sheet 2/5)  
Figure 404

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Throttle Control - Right Side (Sheet 3/5)

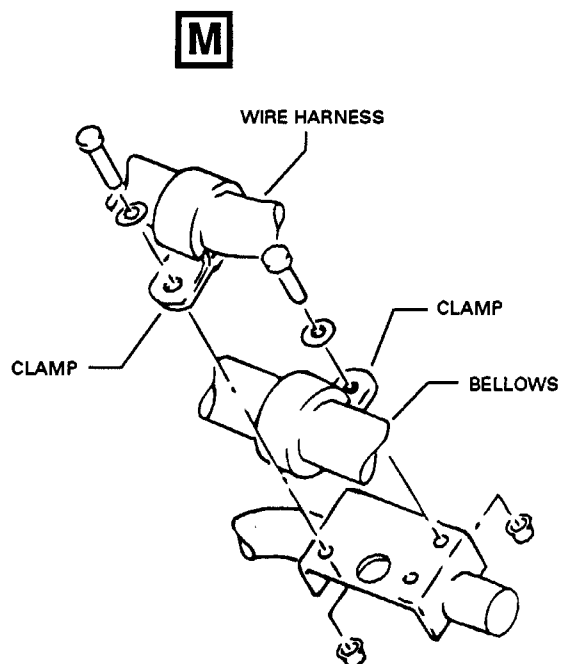
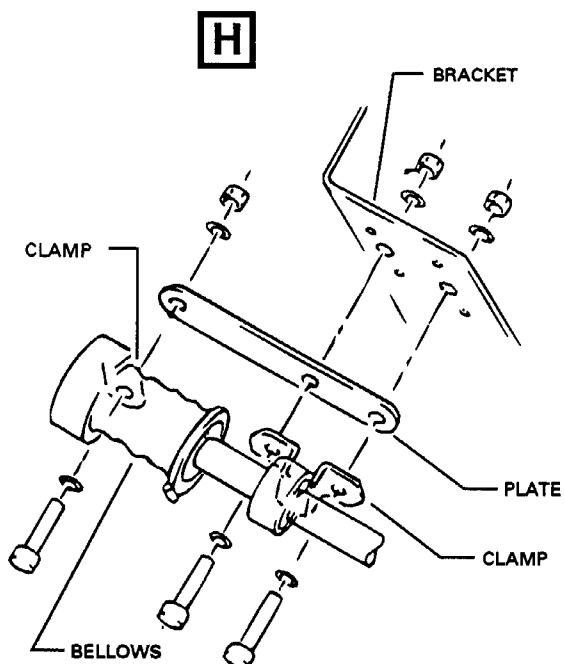
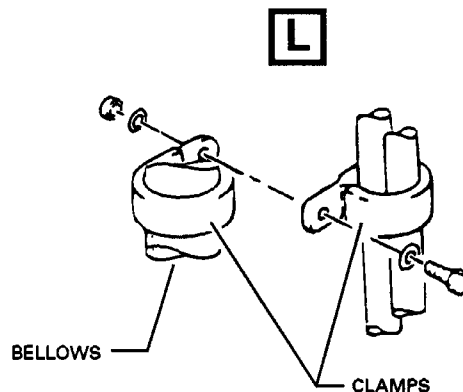
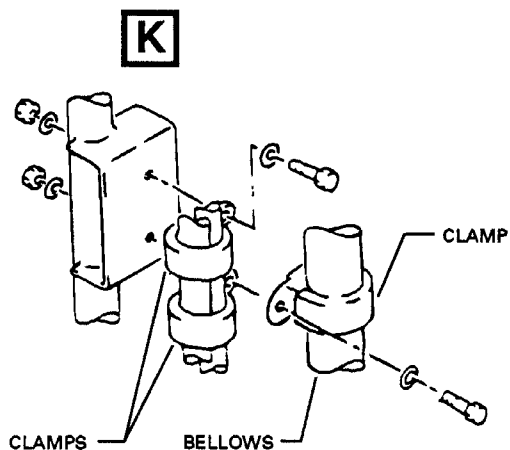
Figure 404

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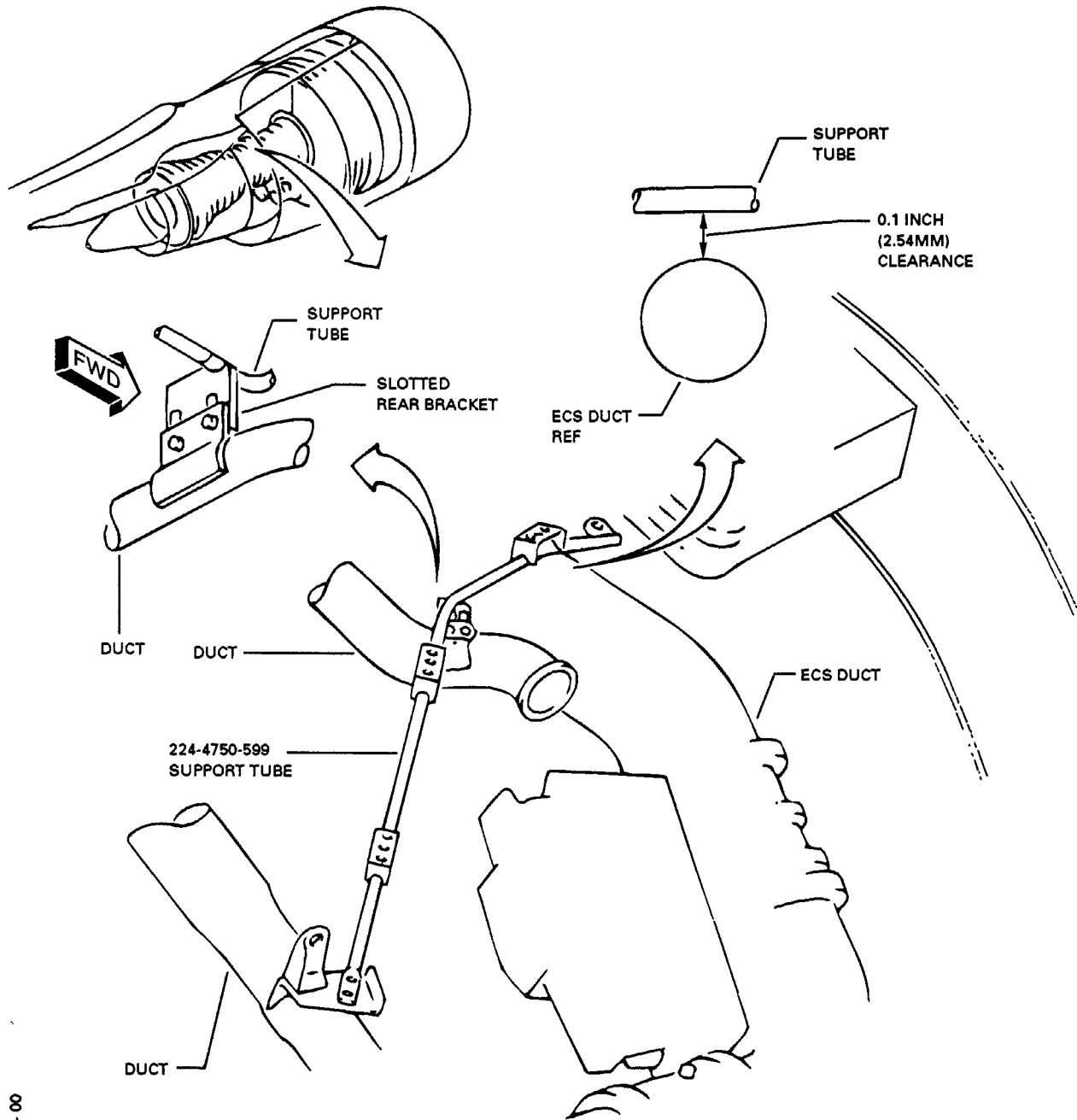
Throttle Control - Right Side (Sheet 4/5)  
Figure 404

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Throttle Control - Right Side (Sheet 5/5)  
Figure 404

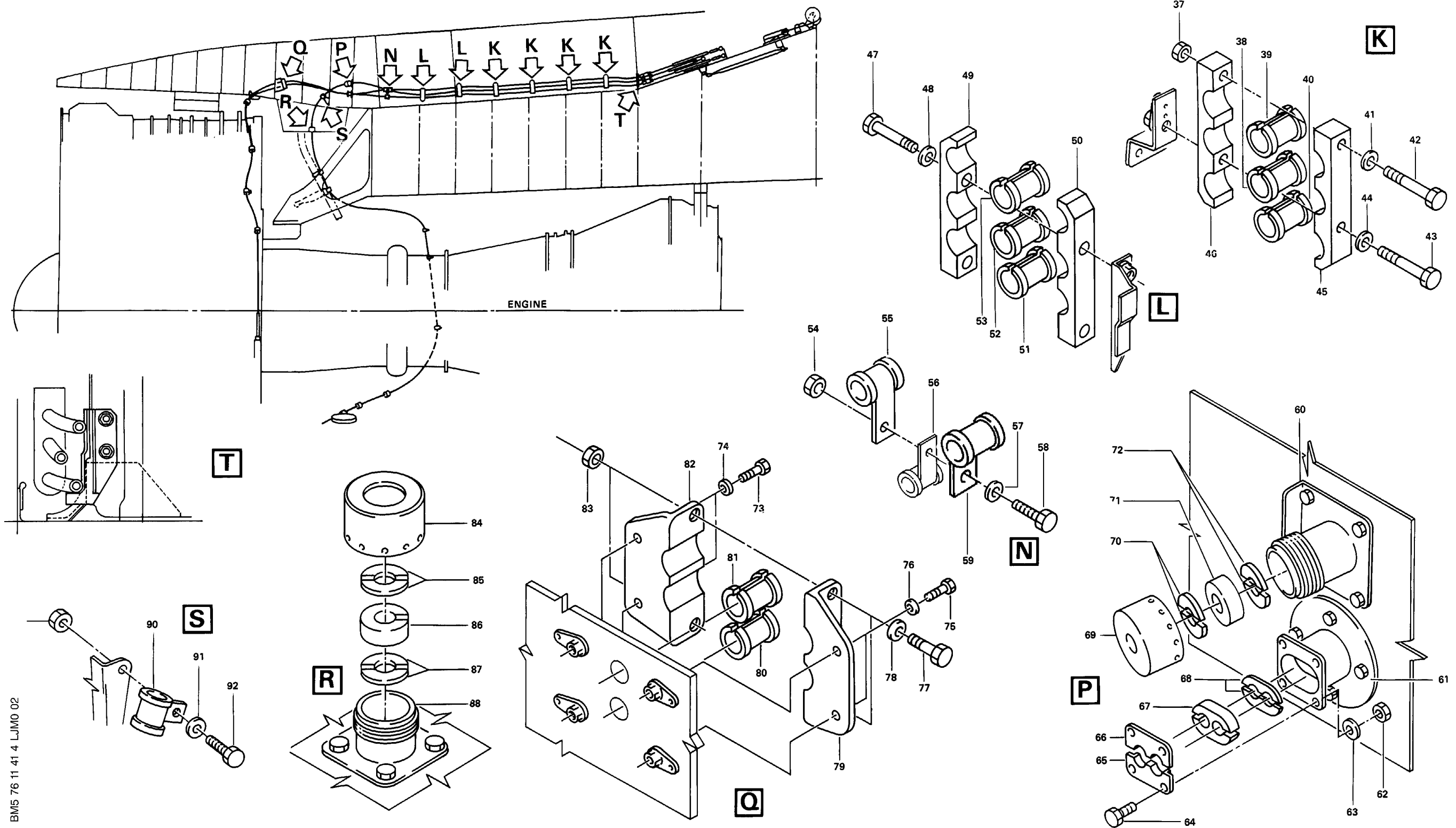
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Throttle Control in Pylon  
Figure 405

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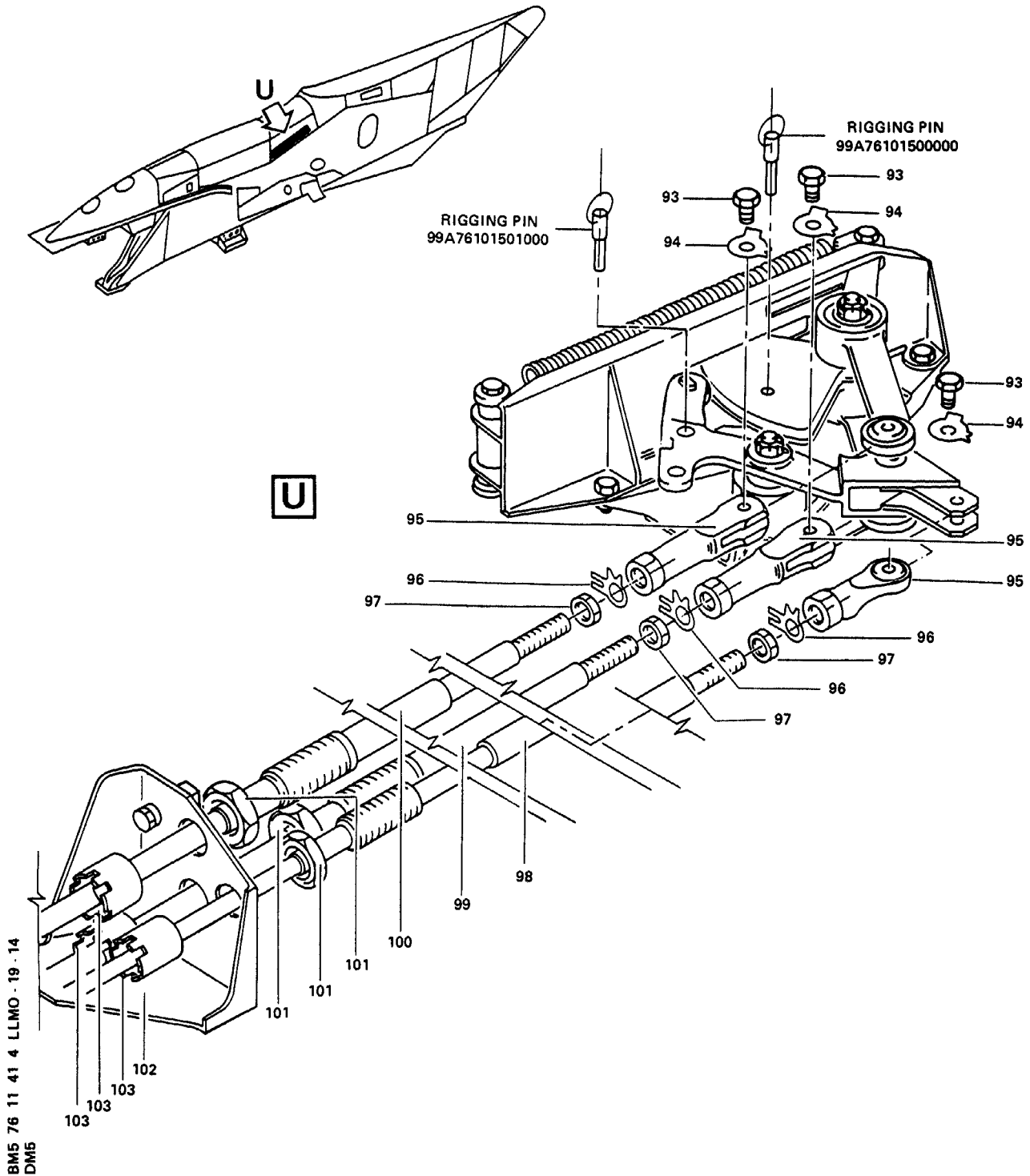
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BM5 76 11 41 4 LJMO 02



Primary Transmission Crank Lever Rigging and  
Telescopic Rod Disconnection  
Figure 406

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## AIRCRAFT MAINTENANCE MANUAL

### THROTTLE CONTROL BOX - REMOVAL/INSTALLATION

#### 1. General

Access to the box is through the right fan thrust reverser door.

#### 2. Equipment and Materials

| ITEM                     | DESIGNATION                        |
|--------------------------|------------------------------------|
| A.                       | Circuit Breaker Safety Clips       |
| B.                       | Torque Wrench                      |
| C.                       | Corrosion Resistant Steel Lockwire |
| R D. RSE1041-1           | Rigging Pin                        |
| Referenced Procedures    |                                    |
| - 71-13-00, P. Block 301 | Cowl Doors                         |
| - 76-11-00, P. Block 501 | Throttle Controls                  |

#### 3. Procedure

##### A. Job Set-Up

- (1) Open, safety and tag the appropriate circuit breakers and open the right fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).
- (2) Insert rigging pin on primary relay (Ref. 76-11-00, P. Block 501).

##### B. Removal (Ref. Fig. 401)

- (1) Disconnect control cable from throttle control box by removing both bolts from splice clamp and removing clamp.
- (2) Remove bolts attaching box to fuel control and remove box.

##### C. Installation (Ref. Fig. 401)

- R (1) Insert rigging pin, RSE1041-1, through flange of fuel control body and engage slot on power lever at 80° rig position.
- (2) Install box on fuel control with bolts and washers, making certain tangs on control box engage power lever. TORQUE bolt to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN) and wirelock.
- (3) Loosen jam nut and adjust rod until rack stand-out is 0.395 to 0.455 in. (10.03 to 11.56 mm). TORQUE jam nut to between 100 and 140 lbf.in. (1.13 and 1.58 m.daN) and wirelock.
- (4) Attach control cable to throttle control box with clamp and two bolts. TORQUE bolts to between 28 to 32 lbf.in. (0.31 to 0.36 m.daN) and wirelock.
- (5) Remove rigging pin from fuel control.
- (6) Remove rigging pin from primary relay (Ref. 76-11-00, P. Block 501).

##### D. Rig Throttle Control Box (Ref. 76-11-00, P. Block 501)

##### E. Close-Up

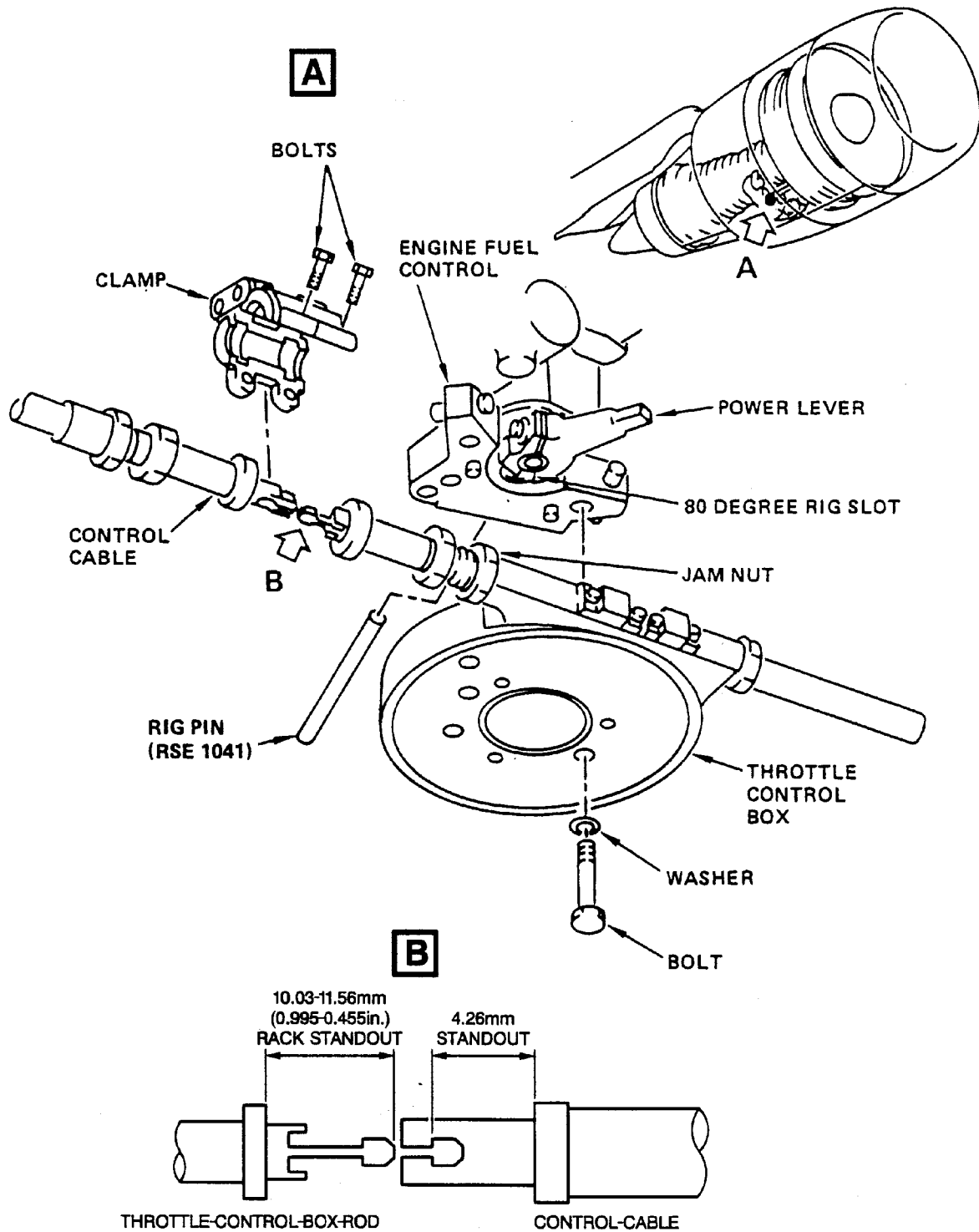
- (1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
- (2) Close right thrust reverser and fan cowl doors and remove safety clips and tags and close circuit breakers (Ref. 71-13-00, P. Block 301).

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Throttle Control Box  
Figure 401

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**AIRCRAFT MAINTENANCE MANUAL**

**HP FUEL SHUT OFF VALVE CONTROL - DESCRIPTION AND OPERATION**

**1. General (Ref. Fig. 001)**

The HP fuel shut off valve control is electromechanical.

When, the HP fuel shut off valve control lever, located on flight compartment center pedestal panel 9VU, is placed in ON position, the selected engine, ignition circuits are energized and an electrical signal is sent to a SHIMADZU motor. The motor gear train drives a ballscrew actuator, which in turn drives a lever on the MEC by means of rods.

The HP fuel shut off valve lever nominal range is 45°. The valve is fully open at 45° and fully closed at 5°.

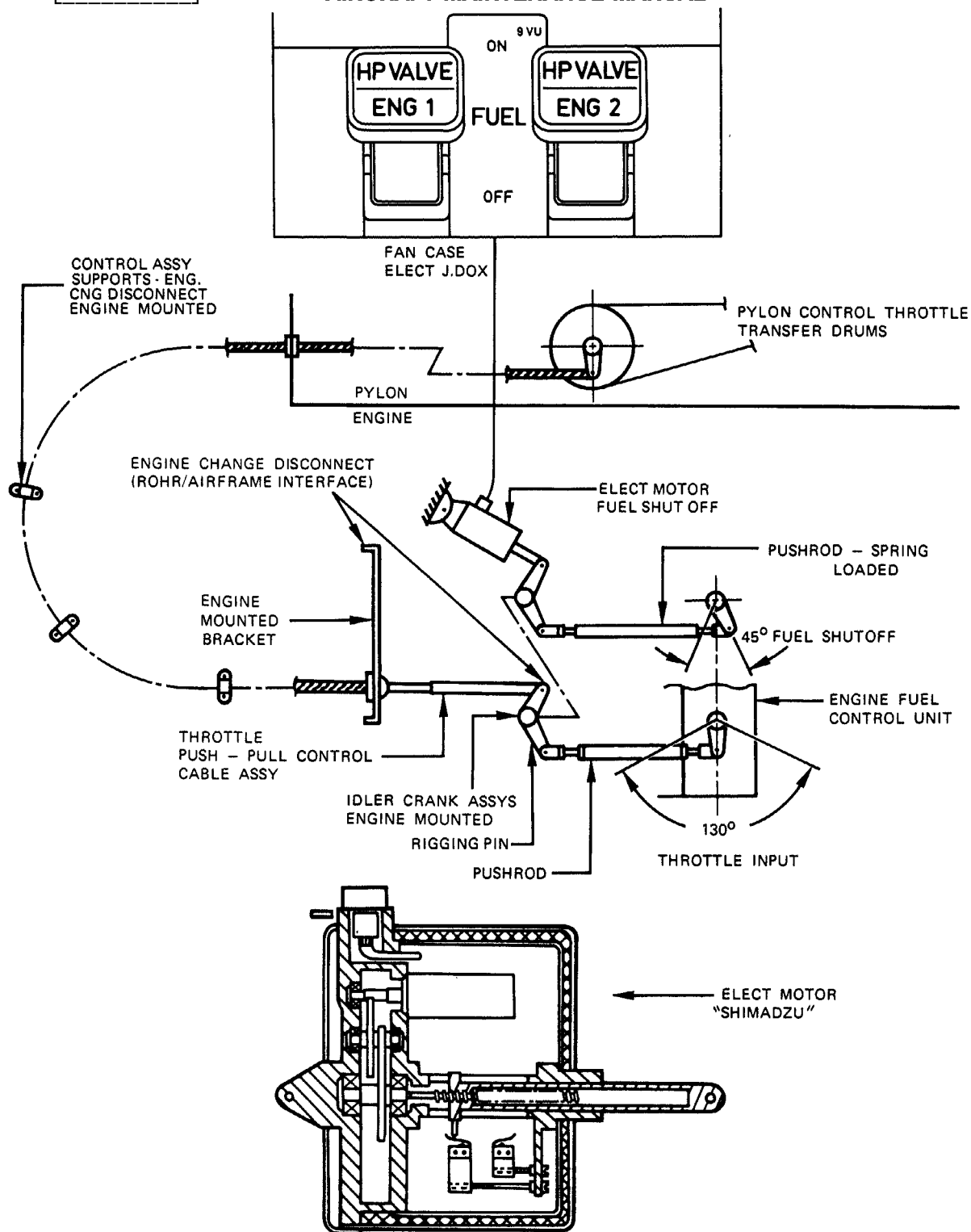
The HP fuel shut-off valve actuator includes start/stop microswitches which disconnect electrical power once the actuator reaches end of travel and the the MEC shut-off lever achieves opening and closing.

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Engine Control System  
Figure 001

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**2. Electrical Operation (Ref. Fig. 002, 003)**

The electrical motor controlling the HP fuel shut off valve is controlled with 28VDC from ESS BUS/SHEDDABLE/LAND RECOVERY busbar 307PP through circuit breaker 3KC (4KC) which is self-monitored on the ground (circuit WY) and located on lateral panel 133VU.

**A. Opening of the HP fuel shut off valve**

Setting of HP fuel shut off valve control lever 7KC (8KC) to ON, results in :

- de-energization of relays 13KC (14KC) and 19KC (18KC) and energization of timing relay 31KC (30KC)
- energization of the selected engine ignition circuit (circuit JH)
- energization of relay 27KC (26KC) which closes and supplies the motor in the opening mode.

After motor starting, the end of travel microswitches on the SHUT section close. The motor is no longer grounded through the center ground point but through relay 27KC (26KC) when the HP fuel shut off valve is fully open, the end of travel microswitches on the OPEN section close, thus energizing relay 29KC (28KC) and de-energizing timing relay 31KC (30KC).

**B. Closure of the HP Fuel Shut off Valve**

Setting of the HP fuel shut off valve control lever 7KC (8KC) to OFF, results in

- de-energization of relay 29KC (28KC) and energization of timing relay 31KC (30KC)
- de-energization of the selected engine ignition circuits (circuit JH)
- de-energization of relay 27KC (26KC), which supplies the motor in the closure mode.

After motor starting, the end of travel microswitches on the OPEN section close. The motor is no longer grounded through the center ground point but through relay 27KC (26KC). When the HP fuel shut off valve is fully closed, the end of travel microswitches on the SHUT section close, which energizes relays 13KC (14KC) and 19KC (18KC) again, and de-energizes timing relay 31KC (30KC). Amber ENG warning light is then triggered on the WLDP.

**C. Fuel Shut Off Valve in Transmit**

In this case, relays 13KC (14KC), 29KC (28KC) and 19KC (18KC) are de-energized, thus permitting energization of timing relay 31KC (30KC). If the HP fuel shut off valve remains in an intermediate position for more than three seconds relay 31KC (30KC) closes the red ENG1 HP VALVE (ENG2 HP VALVE) warning light comes on.

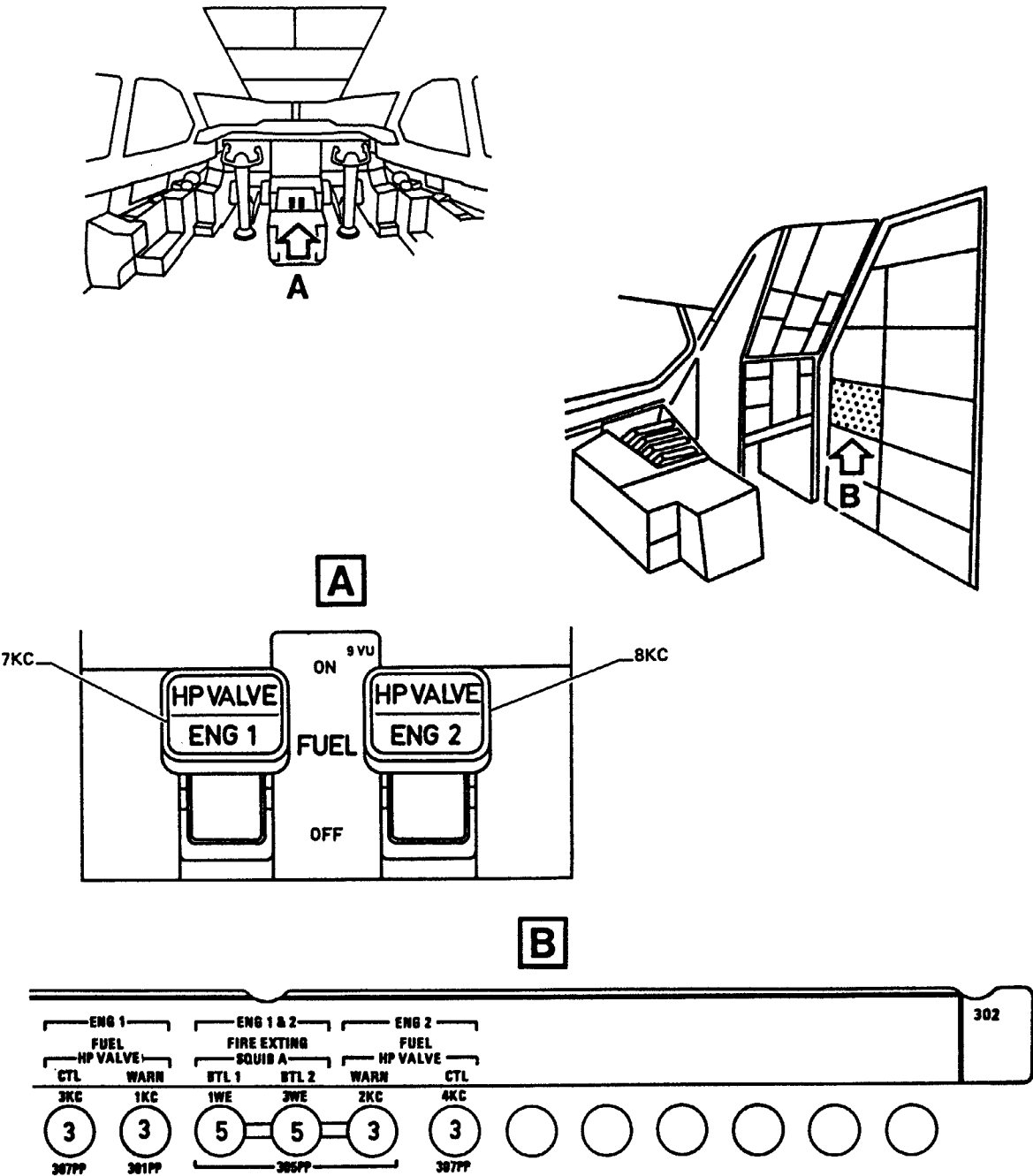
**D. Engine Fire**

**(1) HP fuel shut off valve open**

In this case, relay 19KC (18KC) is de-energized. In case of engine fire relay 17KC (12KC) is energized and triggers the red ENG1 HP VALVE (ENG2 HP VALVE) warning light.

**(2) HP fuel shut off valve closed**

In this case, relay 19KC (18KC) is energized and closes, cutting off supply to ENG1 HP VALVE (ENG2 HP VALVE) warning light.



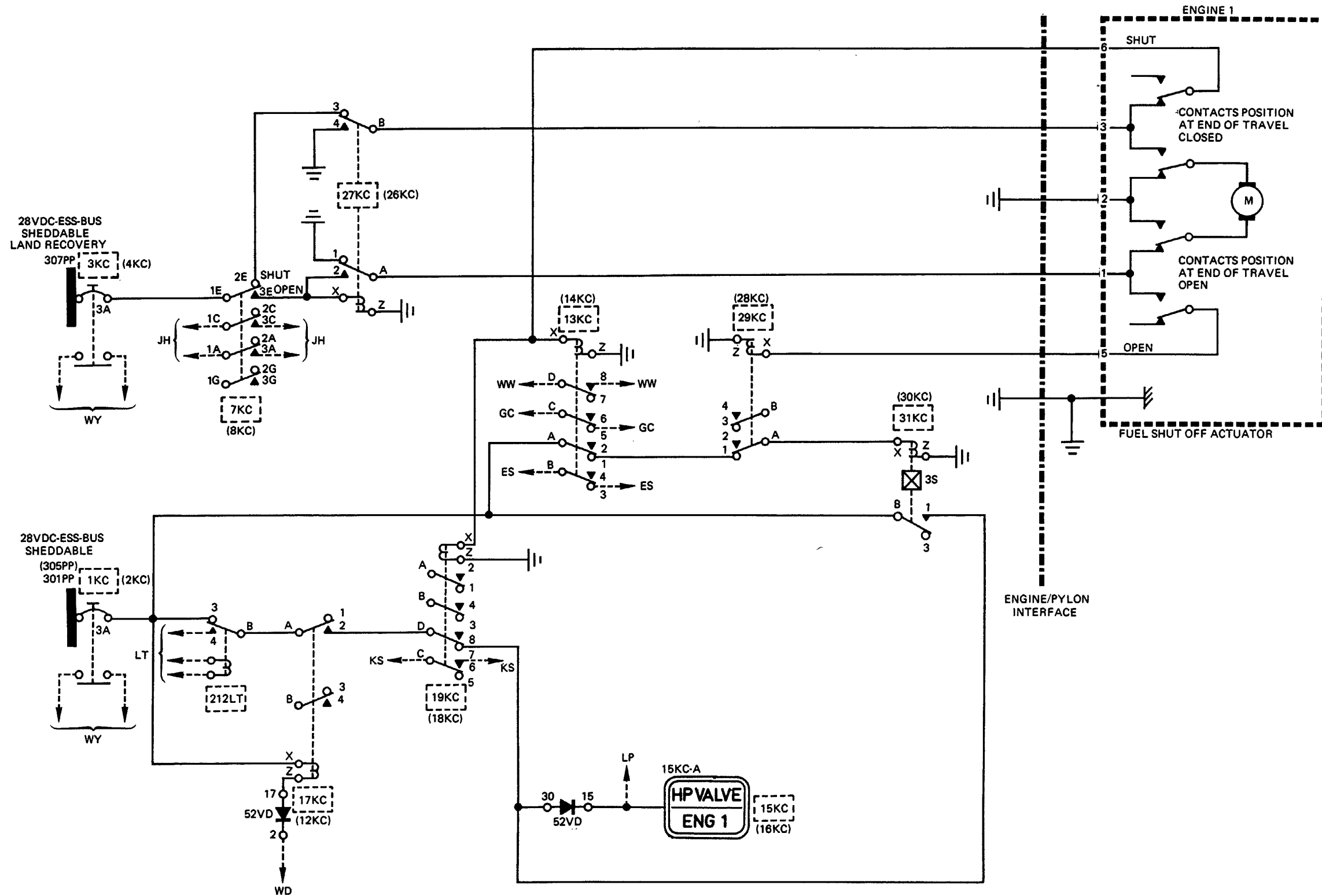
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Flight Compartment - Component Location  
Figure 002

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HP Fuel Shut Off Control - Engine 1  
Figure 003

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## AIRCRAFT MAINTENANCE MANUAL

### HP FUEL SHUT-OFF VALVE CONTROL LEVERS - REMOVAL/INSTALLATION

**WARNING :** BEFORE ATTEMPTING REMOVAL/INSTALLATION PROCEDURES FOR HP FUEL SHUT-OFF VALVE CONTROL LEVERS, MAKE CERTAIN HP FUEL SHUT-OFF VALVES ARE CLOSED AND CIRCUIT BREAKERS ASSOCIATED WITH CENTER CONTROL PEDestal 9VU ARE OPENED. AS A SAFETY PRECAUTION, DISPLAY WARNING NOTICES ON CIRCUIT BREAKER PANELS 22VU AND 133VU.

**NOTE :** Removal/Installation procedures are identical for both HP fuel shut-off valve control levers.

#### 1. Equipment and Materials

| ITEM                     | DESIGNATION                  |
|--------------------------|------------------------------|
| A.                       | Circuit Breaker Safety Clips |
| B.                       | Warning Notices              |
| Referenced Procedures    |                              |
| - 24-41-00, P. Block 301 | AC External Power Control    |
| - 71-00-00, P. Block 501 | Power Plant - General        |
| - 74-00-00, P. Block 501 | Ignition                     |

#### 2. Procedure

##### A. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

| PANEL | SERVICE                       | IDENT. | LOCATION |
|-------|-------------------------------|--------|----------|
| 133VU | ENG1/FUEL HP VALVE/WARN       | 1KC    | 333/T68  |
| 133VU | ENG1/FUEL HP VALVE/CTL        | 3KC    | 333/T69  |
| 133VU | ENG2/FUEL HP VALVE/WARN       | 2KC    | 335/R73  |
| 133VU | ENG2/FUEL HP VALVE/CTL        | 4KC    | 333/T70  |
| 133VU | ENG1/FIRE EXTING SQUIB A/BTL1 | 1WE    | 335/R71  |
| 133VU | ENG2/FIRE EXTING SQUIB A/BTL2 | 3WE    | 335/R72  |
| 22VU  | ENG1/FIRE EXTING SQUIB B/BTL1 | 5WE    | 207/C19  |
| 22VU  | ENG2/FIRE EXTING SQUIB B/BTL2 | 7WE    | 207/C20  |

(2)Display warning notices on panels 133VU and 22VU prohibiting use of circuit breakers.

##### B. Removal of HP Fuel Shut-Off Valve Control Lever (Ref. Fig. 401, 402)

(1)Remove screws (1). Remove ON-FUEL-OFF center plate (3) and HP VALVE/ENG1 plate (4) (HP VALVE/ENG2 plate (2)).

(2)Place HP fuel shut-off valve control lever to be removed in ON position, remove screws (5) and cover (6).

(3)Remove nut (8) grounding lead (7) and disconnect supply cable (9).

(4)Remove screws (12) and (13) and disengage control lever assembly from housing.

(5)Disconnect terminal lugs from switch (10).

(6)Check wires for correct condition and lugs for security of attachment.

Make certain that hardware is correctly tightened and free from traces of

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wear and corrosion.

**C. Disassembly of HP Fuel Shut-Off Valve Control Lever (Ref. Fig. 403)**

- (1) Drive out cotter pins (26) and remove pins (27) and washers (28) to separate HP fuel shut-off valve control lever from casing (29).
- (2) Remove switch (10) from casing (29).
- (3) Remove screws (30) and plate (31).
- (4) Remove screws (18) and integrally lighted identification plate (17).
- (5) Drive out piano wire (23) and remove knob (21) and receptacle (20).
- (6) Remove spindle (25), spring (24) and swinging yoke (22).

**D. Assembly of HP Fuel Shut-Off Valve Control Lever (Ref. Fig. 403)**

**NOTE** : Both HP fuel shut-off valve control levers are identical, only one assembly is covered.

- (1) Install three-pole toggle switch (10) on casing (29).
- (2) Install inserts (32) on knob (21).
- (3) Install integrally lighted identification plate (17) equipped with receptacle connector (20) and lamps on knob (21) with screws (18).
- (4) Engage spring (24) and spindle (25) on swinging yoke (22). Then assemble equipped swinging yoke on knob (21) with pin (23).

**E. Installation of HP Fuel Shut-Off Valve Control Lever (Ref. Fig. 401, 402)**

- (1) Place HP fuel shut-off valve control lever (16) in position on center pedestal.
- (2) Connect electrical wiring to switch (10). Check wires for correct condition and security of attachment.
- (3) Install tubular support (11) on casing (29) with screws (13) and washers (14). Tighten screws.
- (4) Install HP fuel shut-off valve control lever on center pedestal with screws (12) and washers (15). Tighten screws.
- (5) Install grounding lead (7) and nut (8), connect supply cable (9).
- (6) Place lever in ON position, install inserts (19) on swinging yoke. Then install blanking cover (6) with screws (5) and washers. Tighten screws.
- (7) Install integrally lighted identification plate (3) equipped with lamps and receptacle connector, and secure with screws (1). Tighten screws.
- (8) Install blanking plate (2) and/or (4) and secure with screws (1). Tighten screws.

**D. Test (Ref. Fig. 401)**

- (1) Job set-up
  - (a) Remove warning notices prohibiting use of circuit breakers on panels 22VU and 133VU.
  - (b) Remove safety clips and tags and close circuit breakers 1KC, 2KC, 3KC, 4KC, 1WE, 3WE, 5WE and 7WE.
  - (c) On panel 132VU, make certain that circuit breakers 1LP, 2LP, 149LP and 153LP are closed.
  - (d) Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
  - (e) Make certain that electronics racks ventilation is correct.
- (2) Procedure

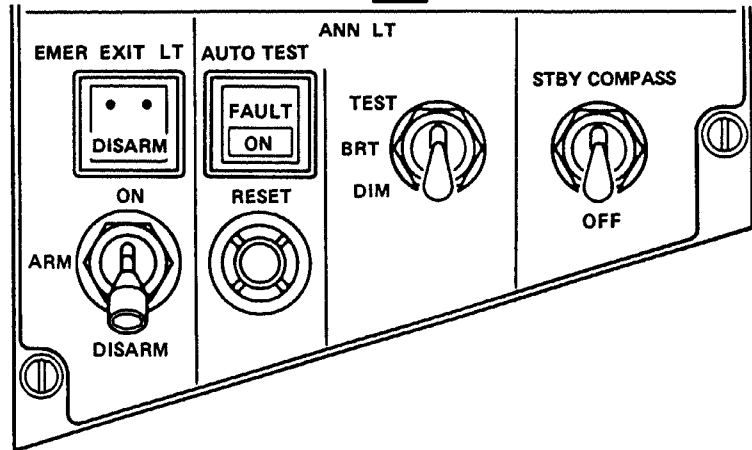
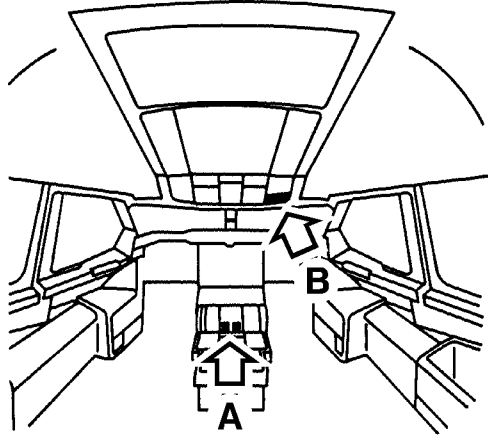
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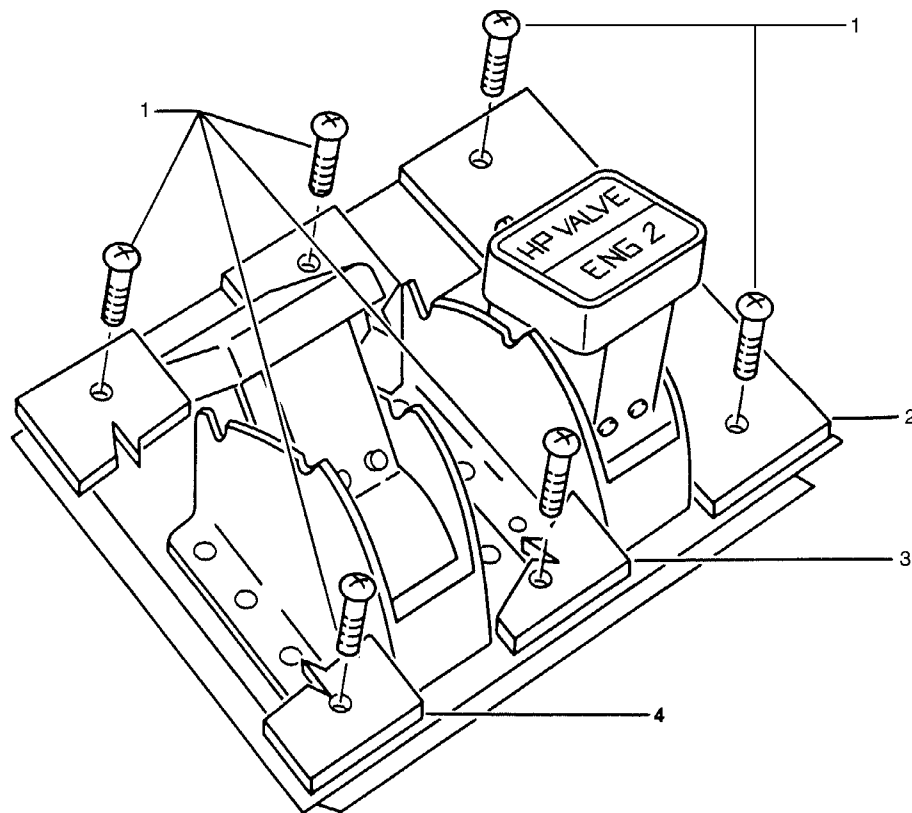
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**B**



**A**



HP Fuel Shut-Off Valve Control Lever  
Figure 401

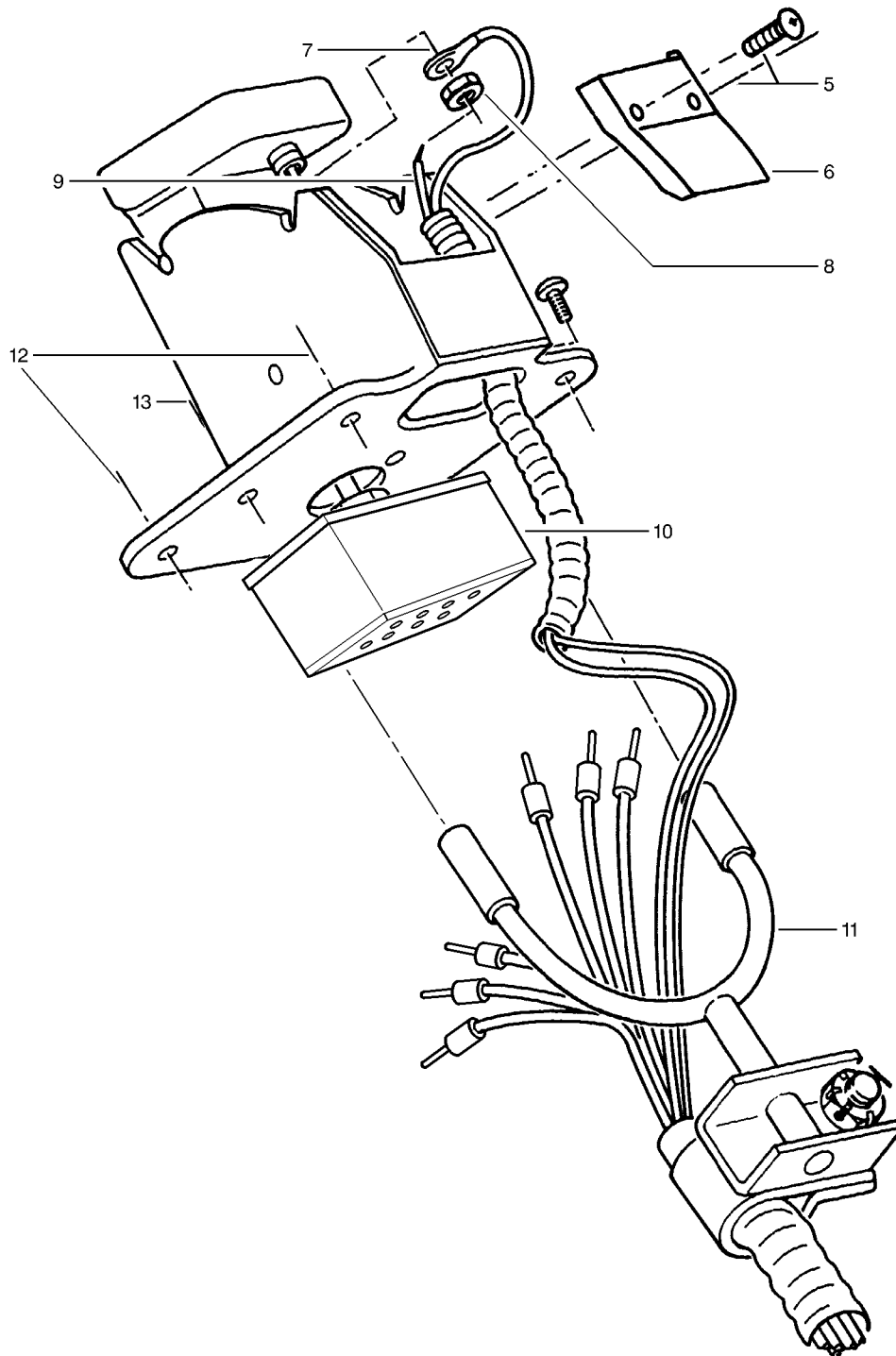
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HP Fuel Shut-Off Valve Control Lever  
Figure 402

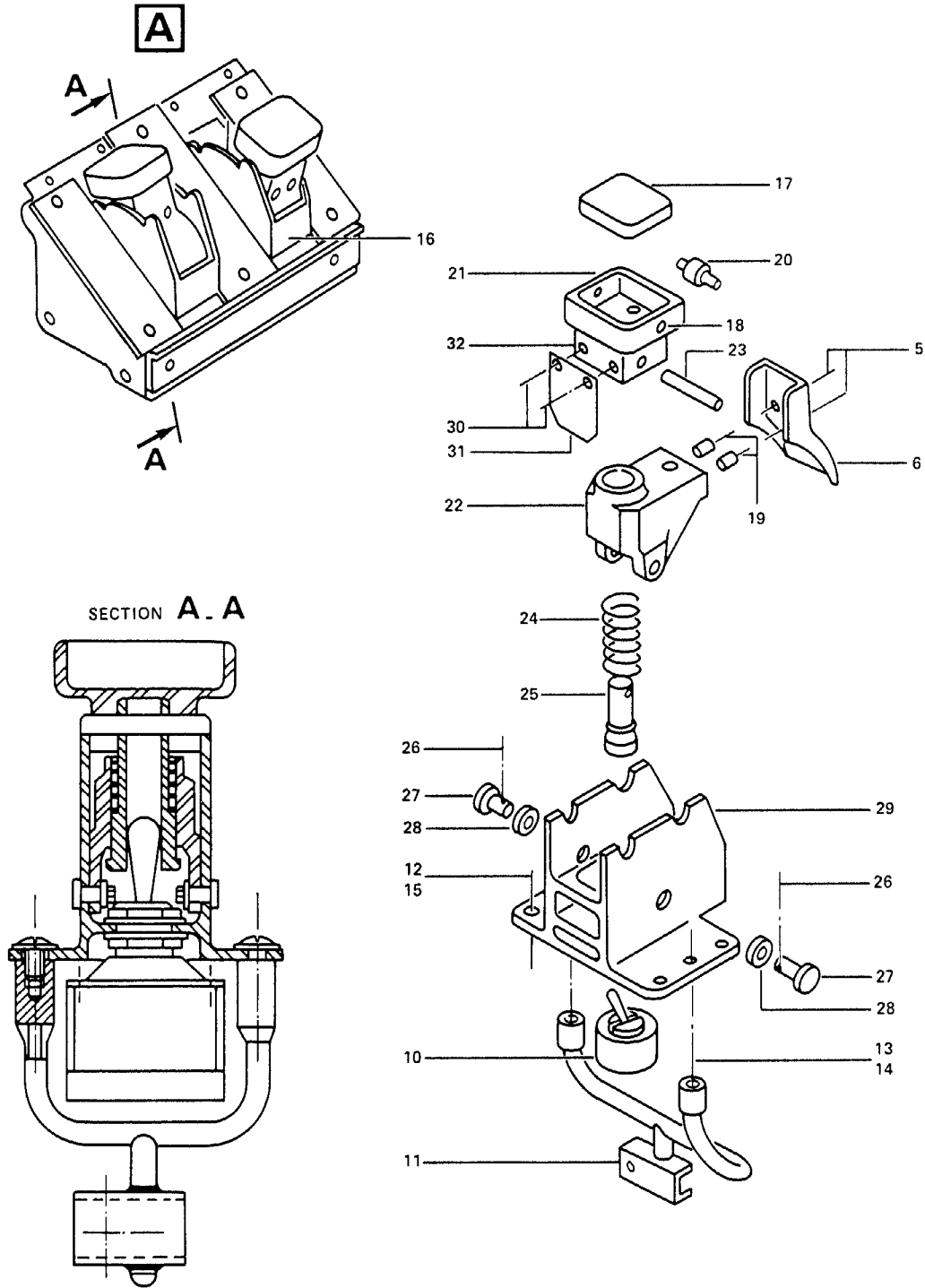
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HP Fuel Shut-Off Valve Control Lever  
Figure 403

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| ACTION                                                                                                                                                                                                                                                                                                                                                   | RESULT                                                                                                                                                                                                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Overhead Panel</b><br>On panel 436VU<br><b>MANUAL TEST</b> <ul style="list-style-type: none"> <li>- place ANN LT switch in TEST position</li> <li>- place ANN LT switch in BRT position</li> </ul> <b>AUTOMATIC TEST</b> <ul style="list-style-type: none"> <li>- with ANN LT switch in BRT position, press AUTO TEST pushbutton switch</li> </ul> | All annunciator lights come on on the various panels as well as HP VALVE/ENG1 (HP VALVE/ENG2) warning light.<br>All annunciator lights go off if no fault.<br><br>The automatic light test is initiated. The pushbutton switch unlatches automatically upon completion of the test or if pressed again to interrupt the test. |
| <p><b>NOTE 1</b> : The annunciator lights not checked automatically remain on.</p> <p><b>NOTE 2</b> : The digital displays show eight.</p> <p><b>NOTE 3</b> : If a faulty light is detected during the automatic light test, press RESET pushbutton switch to continue the test.</p>                                                                     |                                                                                                                                                                                                                                                                                                                               |
| <p style="text-align: right;">At the end of the automatic light test, ON legend of AUTO TEST pushbutton switch goes off.</p>                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                               |

- (3)Perform Wet Motoring (Ref. 71-00-00, P. Block 501).
- (4)Perform test of ignition system (Ref. 74-00-00, P. Block 501).

- E. Close-Up**
- (1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
  - (2)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

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## AIRCRAFT MAINTENANCE MANUAL

### EMERGENCY SHUTDOWN - DESCRIPTION AND OPERATION

#### 1. General (Ref. Fig. 001)

The function of the LP fuel shut off valve is to control the fuel supply at engine-to-pylon interface.

The valve is located on the engine supply system in the wing leading edge. The valve is of the spherical plug type. A 90° rotation of its control shaft enables spherical plug travel from open to closed position.

In the open position, the loss of load due to the LP valve is as reduced as possible.

A self-locking device prevents the valves from being opened by high fuel pressure.

The LP fuel shut off valve is controlled from the flight compartment overhead panel by the fire handle which comprises a red ENG1 (ENG2) FIRE warning light.

Pulling the fire handle sends an electrical signal to the twin motors which drive the LP fuel shut off valve.

#### 2. Operation

(Ref. Fig. 002)

(Ref. Fig. 003)

##### A. Closure of the LP Fuel Shut Off Valve

When ENG FIRE handle is pulled, the two contacts in module 39WD (40WD) close, which simultaneously feeds the "SHUT" coils of the two motors.

A failure detection device is provided to monitor correct operation of both motors.

After the motors have started to run, "OPEN" contacts of 13QG (14QG) open.

During rotation of the valves, FUEL/ENG/LP VALVES annunciators are off.

When the valve reaches its closed position, the contacts "SHUT" close with the following results :

- illumination of the amber SHUT legend on the LP VALVES annunciator
- powering of the L ECAM display unit which provides the crew with information on the action to be taken.

##### B. Opening of the LP Fuel Shut Off Valve

When ENG FIRE handle is returned (pushed back) to its initial position, the two contacts in module 39WD (40WD) are de-energized. The two relays 9QG (10QG) and 11QG (12QG) are no longer powered. As a consequence, power is fed to the "OPEN" coils of the two motors.

After the motors have commenced running, the "SHUT" contacts of 13QG (14QG) close.

During transit of the valves, FUEL/ENG/LP VALVES annunciators are off.

When the LP fuel shut-off valve is fully open, the "OPEN" contacts of 13QG (14QG) open with the result that the continuity flowbar comes on on the annunciator.

##### C. Engine Fire (Ref. 26-00)

In the event of an engine fire having been detected

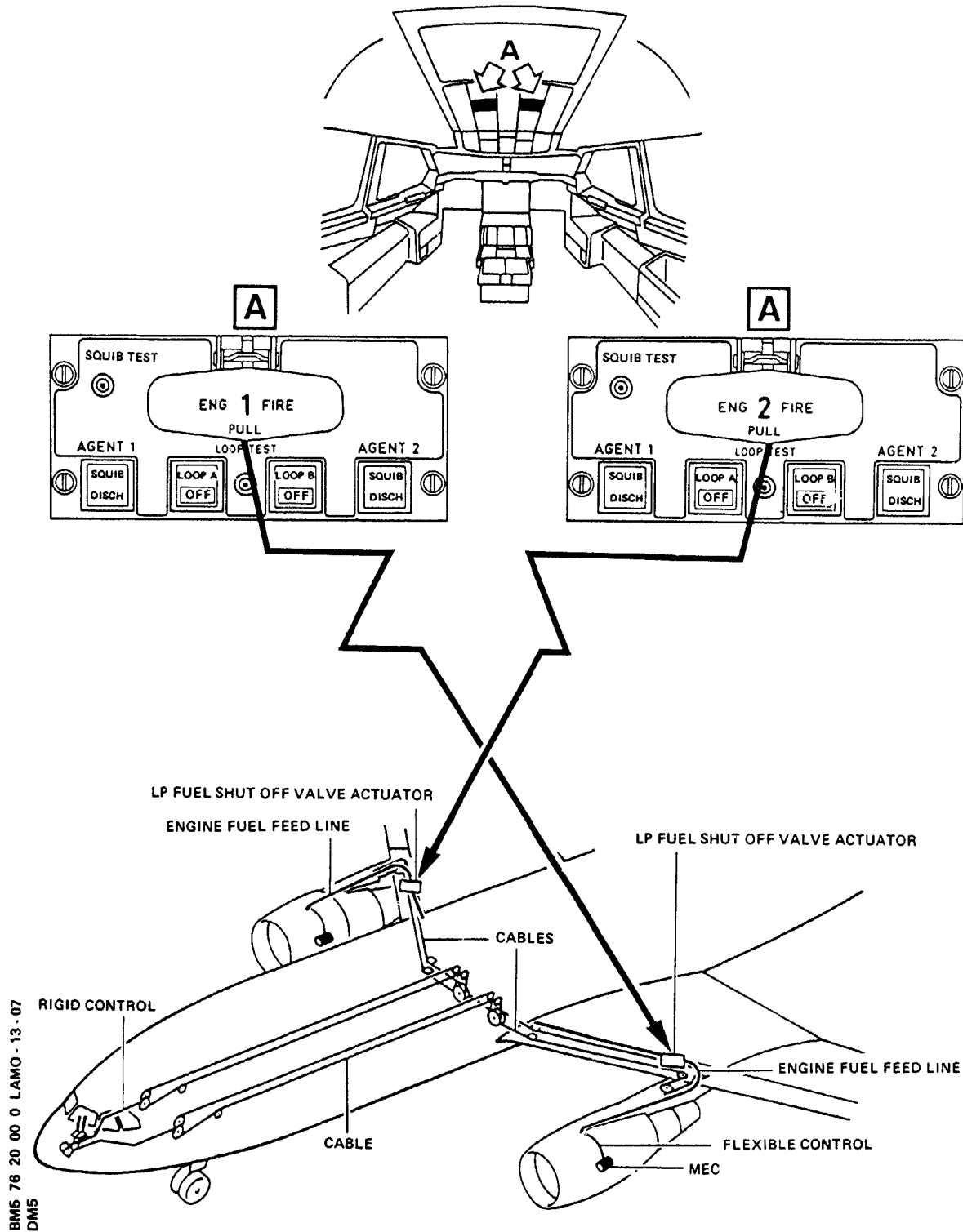
- the red HP VALVE ENG1 (HP VALVE (ENG2)) warning light in the HP fuel

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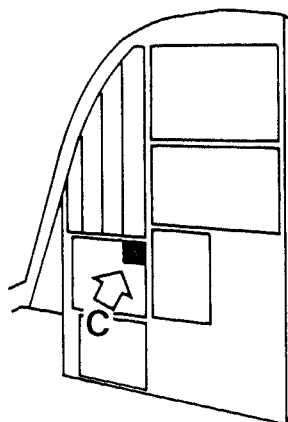
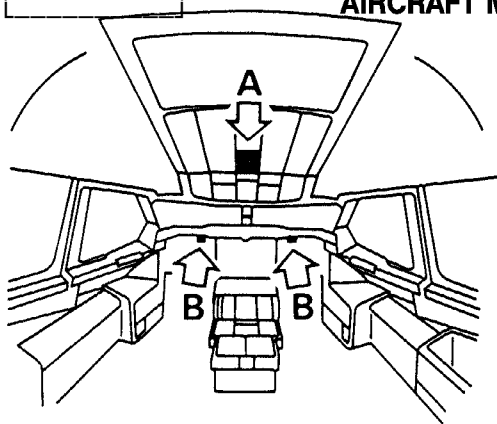
Component Location  
Figure 001

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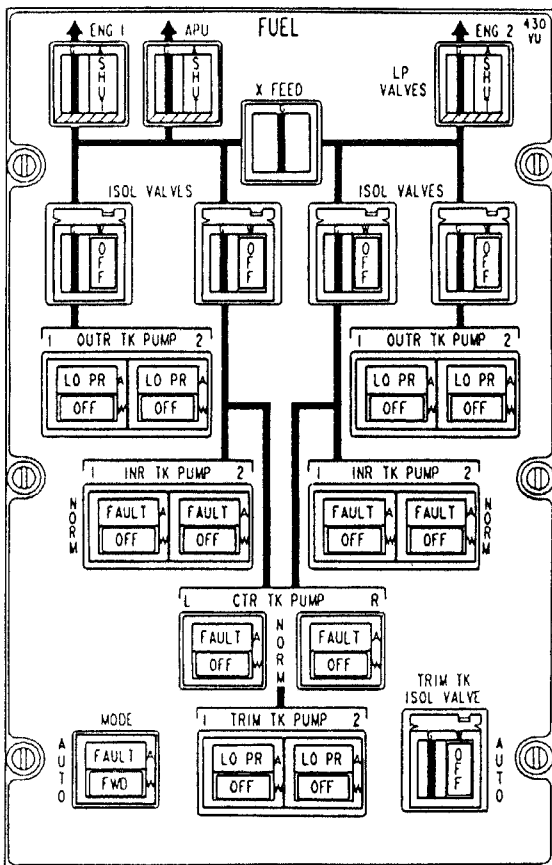


**B**

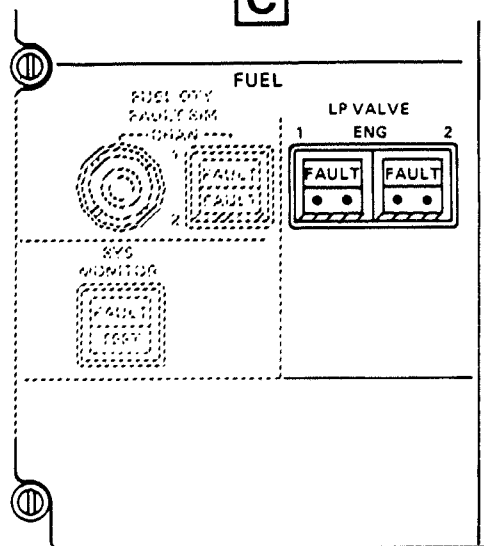
MASTER  
WARN

MASTER  
CAUTION

**A**



**C**



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DM5

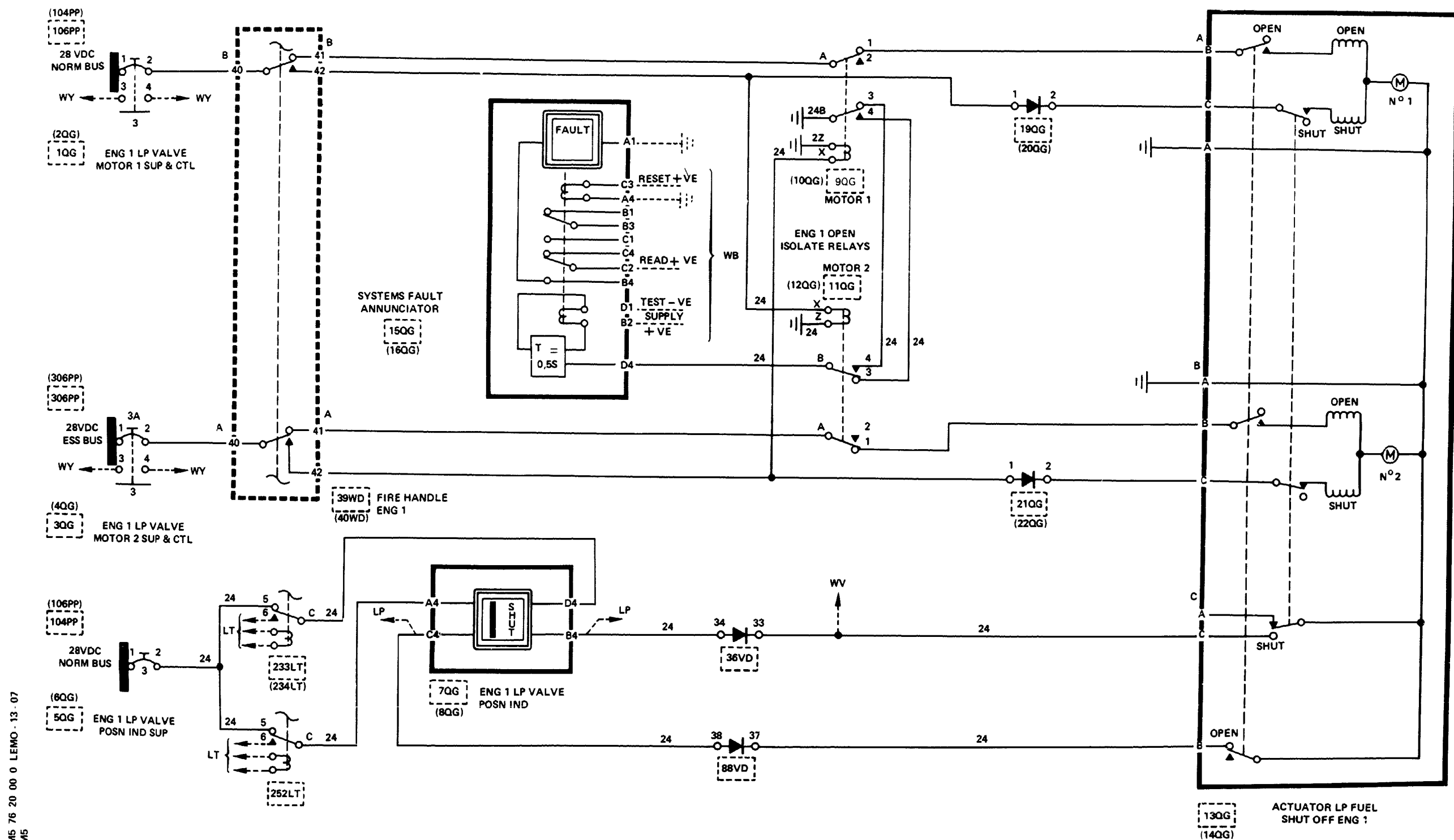
Component Location  
Figure 002

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LP Fuel Shut Off Valve Control & Indication - Eng 1  
Figure 003

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shut-off valve control lever comes on

- the red ENG1 FIRE (ENG2 FIRE) warning light in the fire handle comes on.
- the LOOP A and LOOP B warning lights legends of the engine concerned come on.

The actions to be taken in such case are :

- reduce throttle
- close HP fuel shut off valve
- pull the fire handle which will have the following effect :
  - . extinguish the LOOP A and LOOP B warning lights
  - . illuminate the white SQUIB legends of AGENT1 and AGENT2 pushbutton switches (fire extinguisher bottle 1 and 2)
  - . closes the LP fuel shut off valves
  - . closes the hydraulic fire valve
  - . cuts off cabin air conditioning
  - . cuts off de-icing
  - . cuts off electrical energization of the generators
- pressing AGENT1 pushbutton switch (white SQUIB legend on), discharges the contents of the first freon bottle located inside the pylon.

When the bottle is empty the amber DISCH legend comes on.

If after 30 seconds the fire is still not extinguished, discharge the second fire extinguisher bottle by pressing AGENT2 pushbutton switch.

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